

**SCANNED**  
3/13/14 *Carmen Johnson*

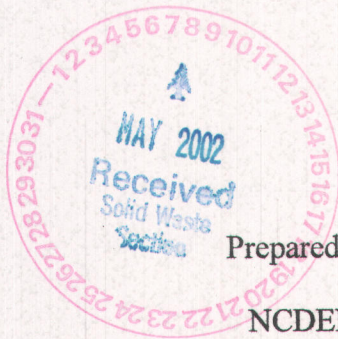
**APPROVED**

DIVISION OF SOLID WASTE MANAGEMENT

DATE 8/12/02 BY JJB  
PTC 92-30

PHASE 1 / RAL. CENT. FILE  
**CONSTRUCTION PLAN  
APPLICATION**

**HIGHWAY 55 C&D LANDFILL  
& RECYCLING CENTER**



Prepared For:

NCDENR  
Solid Waste Section  
Raleigh, North Carolina

Prepared By:

**PATTERSON**

**BREWER**

*& Associates*

Engineering • Surveying • Planning

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**SITING CRITERIA REPORT  
HIGHWAY 55 C & D LANDFILL  
& RECYLING CENTER  
WAKE COUNTY, NORTH CAROLINA**

Prepared for:

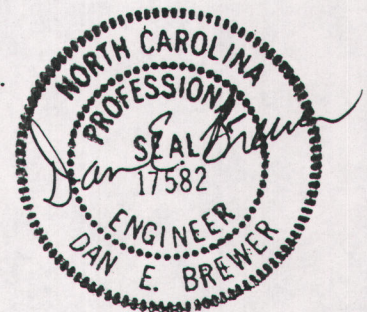
NCDENR  
Solid Waste Section  
Raleigh, North Carolina



Prepared by:

Patterson, Brewer & Associates, P.A.  
P.O. Box 1387  
Mooresville, NC 28115

May 6, 2002



## **SITING CRITERIA REPORT**

The proposed C & D landfill meets the siting criteria requirements of Section .0503 of the Solid Waste Management Rules. The siting criteria requirements are outlined below in bold text. The text that follows each criterion describes where the information is presented.

**Section .0503 (1) - Facilities or practices, shall not be located in the 100-year floodplain.**

As shown on the Site Plan, the proposed site is not located within a 100-year floodplain.

**Section .0503 (2) - Facilities or practices shall not cause or contribute to the taking of any endangered or threatened species of plants, fish, or wildlife.**

A September 24, 2001 letter from the NCDENR Division of Parks and Recreation is presented in the appendix. Based on the letter, there is no record of rare species, significant natural communities, or priority natural areas at the site.

**Section .0503 (3) - Facilities or practices shall not result in the destruction or adverse modification of the critical habitat of endangered or threatened species as identified in 50 CFR Part 17 which is hereby incorporated by reference including any subsequent amendments and editions...**

Based upon the referenced September 24, 2001 letter from the NCDENR Division of Parks and Recreation, there is no record of rare species at the site.

**Section .0503 (4) - Facilities or practices shall not damage or destroy an archaeological or historic site.**

An October 11, 2001 letter from NCDENR Department of Cultural Resources presented in the appendix indicates that no archaeological or historic site is present at the site.

**Section .0503 (5) - Facilities or practices shall not cause an adverse impact on a state park, recreation or scenic area, or any other lands included in the state nature and historic preserve.**

The above referenced September 24, 2001 letter from the Division of Parks and Recreation indicates that there are no records of significant natural communities or priority natural areas at or within a one-mile radius of the site.

**Section .0530 (6) - Facilities shall not be located in any wetland as defined in the Clean Water Act, Section 404(b).**

A small wetland area is delineated along a drainage feature just north of Falls Branch in the Phase III portion of the site. Any landfill development that will impact wetlands are permitted through the appropriate State and Federal agencies. A copy of all wetland permit applications and approvals are included in the appendix. These permits describe all permitted wetland crossings allowing up to 149 linear feet of impact.

**Section .0503 (7) - It must be shown that adequate suitable soils are available for cover, either from on or off site.**

Borrow soil calculations are presented in the appendix of the Engineering Report. Based upon an excavation of 600,000 cubic yards of soil, there is adequate quantities of on-site borrow material to operate and close out the landfill.

**Section .0503 (8) - Land clearing and Inert Debris landfills shall meet the following surface and ground water requirements:**

- (a) Facilities or practices shall not cause a discharge of pollutants into waters of the state that is in violation of the requirements of the National Pollutant Discharge Elimination System (NPDES), under Section 402 of the Clean Water Act, as amended.**

Based on the composition of the waste stream, runoff from the site will not cause a discharge of pollutants into surface waters. The proposed erosion and sediment control structures along the perimeter of the site will filter out sediments prior to discharge into existing off-site drainage features.

- (b) Facilities or practices shall not cause a discharge of dredged materials or fill material into waters of the state that is in violation of the requirements under Section 404 of the Clean Water Act, as amended.**

There are no dredged materials on this site. Fill material from excavations will be stockpiled upgradient of the erosion and sediment control structures. In accordance with the erosion and sediment control plan, the stockpile areas will be stabilized in accordance with the seeding specifications.

- (c) Facilities or practices shall not cause non-point source pollution of waters of the state that violates assigned water quality standards.**

Due to the composition of the waste stream, run-off or leachate from the facility is not anticipated to cause a non-point source pollution of waters of the state.

- (d) Waste in landfills with a disposal area greater than two acres shall be placed a minimum of four feet above the seasonal high water table...**

The proposed subgrade elevations of the facility have been design to provide a minimum separation of four feet above the seasonal high water table. The

proposed subgrade elevations are depicted on the Grading Plan and the Profiles in the appendix of the Engineering Report. Detailed information regarding the subsurface conditions is presented in the hydrogeological report. Based on the soil test borings and test pits performed on the site, auger refusal was generally encountered well above anticipated ground water depths.

(e) N/A

**Section .0503 (9) - The facility shall meet the following minimum buffer requirements:**

**(a) 50 feet from the waste boundary to all surface waters of the state as defined in G.S. 143-212.**

As indicated on the Grading Plan, a 50-foot buffer is provided from the waste boundary to adjacent streams.

**(b) 100 feet from the disposal area to property lines, residential dwellings, commercial or public buildings, and wells.**

The site has a 200-foot buffer along the property boundaries as indicated on the Site Plan.

**Section 0503 (10) - The facility shall meet all requirements of any applicable zoning ordinance.**

Wake County has approved the proposed site. Documentation of approval from the Wake County is presented in the Appendix of the Site Plan Application Report.

## **APPENDIX**

**LETTER FROM NCDENR DIVISION OF PARKS AND RECREATION**

**LETTER FROM NC DEPARTMENT OF  
CULTURE RESOURCES**

North Carolina  
Department of Environment and Natural Resources  
Division of Parks and Recreation

Michael F. Easley, Governor  
William G. Ross Jr., Secretary  
Philip K. McKnelly, Director



September 24, 2001

Mr. Dan E. Brewer  
Patterson, Brewer, & Associates  
P.O. Box 1387  
Mooresville, NC 28115

Subject: Proposed Highway 55 C&D Landfill Site near Holly Springs, Wake County

Dear Mr. Brewer:

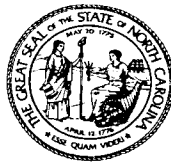
The Natural Heritage Program has no record of rare species, significant natural communities, or priority natural areas at the site nor within a mile of the site.

You may wish to check the Natural Heritage Program database website at [www.ncsparks.net/nhp/search.html](http://www.ncsparks.net/nhp/search.html) for a listing of rare plants and animals and significant natural communities in the county and on the topographic quad map. Please do not hesitate to contact me at 919-715-8687 if you have questions or need further information.

Sincerely,

Harry E. LeGrand, Jr., Zoologist  
Natural Heritage Program

HEL/hel



**North Carolina Department of Cultural Resources  
State Historic Preservation Office**

David L. S. Brook, Administrator

Michael F. Easley, Governor  
Lisbeth C. Evans, Secretary

Division of Archives and History  
Jeffrey J. Crow, Director

October 11, 2001

Dan E. Brewer  
Patterson & Brewer  
PO Box 137  
Mooresville, NC 28115

Re: Proposed Hwy 55 C&D Landfill & Recycling Center, Wake County, ER 02-7731

Dear Mr. Brewer:

Thank you for your letter of September 17, 2001, concerning the above project.

We have conducted a review of the project and are aware of no historic resources, which would be affected by the project. Therefore, we have no comment on the project as proposed.

The above comments are made pursuant to Section 106 of the National Historic Preservation Act and the Advisory Council on Historic Preservation's Regulations for Compliance with Section 106 codified at 36 CFR Part 800.

Thank you for your cooperation and consideration. If you have questions concerning the above comment, please contact Renee Gledhill-Earley, environmental review coordinator, at 919/733-4763. In all future communication concerning this project, please cite the above-referenced tracking number.

Sincerely,

*Renee Gledhill-Earley*

David Brook

DB:kgc

**Administration**  
**Restoration**  
**Survey & Planning**

**Location**  
507 N. Blount St, Raleigh, NC  
515 N. Blount St, Raleigh, NC  
515 N. Blount St, Raleigh, NC

**Mailing Address**  
4617 Mail Service Center, Raleigh 27699-4617  
4613 Mail Service Center, Raleigh 27699-4613  
4618 Mail Service Center, Raleigh 27699-4618

**Telephone/Fax**  
(919) 733-4763 • 733-8653  
(919) 733-6547 • 715-4801  
(919) 733-4763 • 715-4801

**WETLAND PERMIT APPLICATION  
NC DIVISION OF WATER QUALITY  
&  
US ARMY CORPS OF ENGINEER  
PERMIT APPROVALS**



Michael F. Easley  
Governor

William G. Ross, Jr., Secretary  
Department of Environment and Natural Resources

Gregory J. Thorpe, Ph.D., Acting Director  
Division of Water Quality

January 2, 2002  
DWQ# 01-1489  
Wake County

Ron Gilkerson  
Griffin Brothers Companies  
19109 West Catawba Avenue  
Cornelius, NC, 28031

#### APPROVAL of 401 Water Quality Certification

Dear Mr. Gilkerson:

You have our approval, in accordance with the attached conditions, to place fill in 149 linear feet of streams in order to construct the Highway 55 C&D Landfill and Recycling Center in Wake County, as described in your application received by the Division of Water Quality on October 12, 2001, and in additional correspondence received December 21, 2001. After reviewing your application, we have determined that this fill is covered by General Water Quality Certification Number 3287, which can be downloaded from our web site at <http://h2o.cnr.state.nc.us>. This Certification allows you to use Nationwide Permit Number 39 when it is issued by the U.S. Army Corps of Engineers. In addition, you should get any other federal, state or local permits before you go ahead with your project including (but not limited to) Sediment and Erosion Control, Non-Discharge and Water Supply Watershed regulations. You should send an application to the Division of Land Resources for their review of your project under dam safety rules as well as erosion and sediment control. Also this approval will expire when the accompanying 404 permit expires unless otherwise specified in the General Certification.

This approval is only valid for the purpose and design that you described in your application. If you change your project, you must notify us in writing and you may be required to send us a new application for a new certification. If the property is sold, the new owner must be given a copy of the Certification and approval letter and is thereby responsible for complying with all conditions. If total wetland fills for this project (now or in the future) exceed one acre, compensatory mitigation may be required as described in 15A NCAC 2H .0506 (h). For this approval to be valid, you must follow the conditions listed in the attached certification.

If you do not accept any of the conditions of this certification, you may ask for an adjudicatory hearing. You must act within 60 days of the date that you receive this letter. To ask for a hearing, send a written petition which conforms to Chapter 150B of the North Carolina General Statutes to the Office of Administrative Hearings, P.O. Box 27447, Raleigh, N.C. 27611-7447. This certification and its conditions are final and binding unless you ask for a hearing.

This letter completes the review of the Division of Water Quality under Section 401 of the Clean Water Act. If you have any questions, please telephone Steve Mitchell in our Raleigh Regional Office at 919-571-4700 or Cyndi Karoly in Raleigh at 919-733-1786.

Sincerely,

A handwritten signature in cursive script that reads "Cyndi Karoly".

for Gregory J. Thorpe, Ph.D.,

#### Attachment

cc: Corps of Engineers Raleigh Regulatory Field Office  
Raleigh DWQ Regional Office  
Central Files  
File Copy  
Britt Feldner, P.O. Box 1532, Conway, SC, 29528

011489

North Carolina Division of Water Quality, 401 Wetlands Certification Unit,  
1650 Mail Service Center, Raleigh, NC 27699-1650 (Mailing Address)  
2321 Crabtree Blvd., Raleigh, NC 27604-2260 (Location)  
919-733-1786 (Raleigh) 919-733-2222 (Conway)

# U.S. ARMY CORPS OF ENGINEERS

Wilmington District

Action ID: 200220297 County: Wake

## GENERAL PERMIT (REGIONAL AND NATIONWIDE) VERIFICATION

<b>Property</b>	<b>Authorized</b>
<b>Owner</b> <u>Highway 55 C&amp;D Landfill, LLC</u>	<b>Agent</b> <u>The Brigman Company, Inc.</u>
	<u>Attn: Britt Feldner</u>
<b>Address</b> <u>19109 West Catawba Ave., Ste 118</u>	<b>Address</b> <u>P.O. Box 1532</u>
<u>Cornelius, NC 28031</u>	<u>Conway, SC 29528</u>
<b>Telephone Number</b> <u>843-248-9388</u>	<b>Telephone Number</b> <u>843-248-9388</u>

**Size and Location of Property (waterbody, Highway name/number, town, etc.):** The site is located on the north side of Sunset Lake Road (SR 1301), approximately 0.7 miles west of its intersection with N.C. Hwy 55, in Holly Springs, Wake County, North Carolina.

**Description of Activity:** This permit authorizes the installation of culverts and the placement of fill associated with the construction of a C&D (construction and debris) landfill and associated road crossings. Impacts to waters authorized by this permit include 85 linear feet of stream channel for four road crossings and 64 linear feet of stream channel for proposed fill. Total impacts to waters are 149 linear feet of stream channel to Little Branch and its unnamed tributaries in the Cape Fear River Basin.

**Applicable Law:** X Section 404 (Clean Water Act, 33 USC 1344) only.  
                     Section 10 (River and Harbor Act of 1899) only.

**Authorization:**                      Regional General Permit Number  
39                      Nationwide Permit Number

Any violation of the conditions of the Regional General or Nationwide Permit referenced above may subject the permittee to a stop work order, a restoration order, and/or appropriate legal action. This Department of the Army Regional General Permit or Nationwide Permit verification does not relieve the permittee of the responsibility to obtain any other required Federal, State, or local approvals/permits. The permittee may need to contact appropriate State and local agencies before beginning work. If you have any questions regarding the Corps of Engineers regulatory program, please contact Amanda D. Jones at telephone number (919) 876 - 8441 extension 30.

**Regulatory Project Manager Signature** Amanda D. Jones

**Date** December 14, 2001 **Expiration Date** December 14, 2003

**SURVEY PLATS, FIELD SKETCH, WETLAND DELINEATION FORM, ETC., MUST BE ATTACHED TO THE YELLOW (FILE) COPY OF THIS FORM, IF REQUIRED OR AVAILABLE.**

Permit Number: 200220297 – Nationwide Permit Number 39

Name of Permittee: Highway 55 C&D Landfill, LLC

Project Manager: Amanda D. Jones

Issuance: December 14, 2001

Upon completion of the activity authorized by this permit and any mitigation required by the permit, sign this certification and return it to the following address:

**US ARMY CORPS OF ENGINEERS  
RALEIGH REGULATORY FIELD OFFICE  
6508 FALLS OF NEUSE ROAD, SUITE 120  
RALEIGH, NORTH CAROLINA 27615**

Please note that your permitted activity is subject to a compliance inspection by an U.S. Army Corps of Engineers representative. If you fail to comply with this permit you are subject to permit suspension, modification, or revocation.

I hereby certify that the work authorized by the above referenced permit has been completed in accordance with the terms and condition of the said permit, and required mitigation was completed in accordance with the permit conditions.

 12/18/01  
\_\_\_\_\_  
Signature of Permittee

U.S. ARMY CORPS OF ENGINEERS  
Wilmington District

**COPY**

Action ID: 200220297 County: Wake

**NOTIFICATION OF JURISDICTIONAL DETERMINATION**

**Property**

Owner Highway 55 C&D Landfill, LLC

Address 19109 West Catawba Ave., Ste. 118  
Cornelius, NC 28031

Telephone Number 843-248-9388

**Authorized**

Agent The Brigman Company, Inc.

Attn: Jamie McLain

Address P.O. Box 1532  
Conway, SC 29528

Telephone Number 843-248-9388

**Size and Location of Property (waterbody, Highway name/number, town, etc.):** The site is located on the north side of Sunset Lake Road (SR 1301), approximately 0.7 miles west of its intersection with N.C. Hwy 55, in Holly Springs, Wake County, North Carolina.

**Basis for Determination:** The site contains wetlands and stream channels with indicators of ordinary high water marks, located adjacent to and including Little Branch and its unnamed tributaries, above headwaters, in the Cape Fear River Basin.

**Indicate Which of the Following Apply:**

There are waters of the U.S., to include wetlands, on the above described property which we strongly suggest should be delineated and surveyed. The surveyed wetland lines must be verified by our staff before the Corps will make a final jurisdictional determination on your property.

Because of the size of your property and our present workload, our identification and delineation of your wetlands cannot be accomplished in a timely manner. You may wish to obtain a consultant to obtain a more timely delineation of the wetlands. Once the consultant has flagged a wetland line on the property, Corps staff will review it, and, if it is accurate, we strongly recommend that you have the line surveyed for final approval by the Corps. The Corps will not make a final jurisdictional determination on your property without an approved survey.

☒ The waters of the U.S., to include wetlands, on your lot have been delineated, and the limits of the Corps jurisdiction have been explained to you. Unless there is a change in the law or our published regulations, this determination may be relied upon for a period not to exceed five years from the date of this notification.

There are no waters of the U.S., to include wetlands, present on the above described property which are subject to the permit requirements of Section 404 of the Clean Water Act (33 USC 1344). Unless there is a change in the law or our published regulations, this determination may be relied upon for a period not to exceed five years from the date of this notification.

Placement of dredged or fill material in wetlands on this property without a Department of the Army Permit is in most cases a violation of Section 301 of the Clean Water Act (33 USC 1311). A permit is not required for work on the property restricted entirely to existing high ground. If you have any questions regarding the Corps of Engineers regulatory program, please contact

Amanda D. Jones at telephone number (919) 876 - 8441 extension 30

Project Manager Signature Amanda D. Jones

Date December 14, 2001

Expiration Date December 14, 2006

**SURVEY PLAT OR FIELD SKETCH OF THE DESCRIBED PROPERTY AND THE WETLAND DELINEATION FORM MUST BE ATTACHED TO THE YELLOW (FILE) COPY OF THIS FORM.**

# NOTIFICATION OF ADMINISTRATIVE APPEAL OPTIONS AND PROCESS AND REQUEST FOR APPEAL

Applicant: Highway 55 C&D Landfill, LLC	File Number: 200220297	Date: 12-14-01
Attached is:		See Section below
<input type="checkbox"/>	INITIAL PROFFERED PERMIT (Standard Permit or Letter of permission)	A
<input type="checkbox"/>	PROFFERED PERMIT (Standard Permit or Letter of permission)	B
<input type="checkbox"/>	PERMIT DENIAL	C
<input checked="" type="checkbox"/>	APPROVED JURISDICTIONAL DETERMINATION	D
<input type="checkbox"/>	PRELIMINARY JURISDICTIONAL DETERMINATION	E

**SECTION I - The following identifies your rights and options regarding an administrative appeal of the above decision. Additional information may be found at <http://usace.army.mil/inet/functions/cw/cecvo/reg> or Corps regulations at 33 CFR Part 361.**

**A: INITIAL PROFFERED PERMIT:** You may accept or object to the permit.

- **ACCEPT:** If you received a Standard Permit, you may sign the permit document and return it to the district engineer for final authorization. If you received a Letter of Permission (LOP), you may accept the LOP and your work is authorized. Your signature on the Standard Permit or acceptance of the LOP means that you accept the permit in its entirety, and waive all rights to appeal the permit, including its terms and conditions, and approved jurisdictional determinations associated with the permit.
- **OBJECT:** If you object to the permit (Standard or LOP) because of certain terms and conditions therein, you may request that the permit be modified accordingly. You must complete Section II of this form and return the form to the district engineer. Your objections must be received by the district engineer within 60 days of the date of this notice, or you will forfeit your right to appeal the permit in the future. Upon receipt of your letter, the district engineer will evaluate your objections and may: (a) modify the permit to address all of your concerns, (b) modify the permit to address some of your objections, or (c) not modify the permit having determined that the permit should be issued as previously written. After evaluating your objections, the district engineer will send you a proffered permit for your reconsideration, as indicated in Section B below.

**B: PROFFERED PERMIT:** You may accept or appeal the permit

- **ACCEPT:** If you received a Standard Permit, you may sign the permit document and return it to the district engineer for final authorization. If you received a Letter of Permission (LOP), you may accept the LOP and your work is authorized. Your signature on the Standard Permit or acceptance of the LOP means that you accept the permit in its entirety, and waive all rights to appeal the permit, including its terms and conditions, and approved jurisdictional determinations associated with the permit.
- **APPEAL:** If you choose to decline the proffered permit (Standard or LOP) because of certain terms and conditions therein, you may appeal the declined permit under the Corps of Engineers Administrative Appeal Process by completing Section II of this form and sending the form to the division engineer. This form must be received by the division engineer within 60 days of the date of this notice.

**C: PERMIT DENIAL:** You may appeal the denial of a permit under the Corps of Engineers Administrative Appeal Process by completing Section II of this form and sending the form to the division engineer. This form must be received by the division engineer within 60 days of the date of this notice.

**D: APPROVED JURISDICTIONAL DETERMINATION:** You may accept or appeal the approved JD or provide new information.

- **ACCEPT:** You do not need to notify the Corps to accept an approved JD. Failure to notify the Corps within 60 days of the date of this notice, means that you accept the approved JD in its entirety, and waive all rights to appeal the approved JD.
- **APPEAL:** If you disagree with the approved JD, you may appeal the approved JD under the Corps of Engineers Administrative Appeal Process by completing Section II of this form and sending the form to the division engineer. This form must be received by the division engineer within 60 days of the date of this notice.

**E: PRELIMINARY JURISDICTIONAL DETERMINATION:** You do not need to respond to the Corps regarding the preliminary JD. The Preliminary JD is not appealable. If you wish, you may request an approved JD (which may be appealed), by contacting the Corps district for further instruction. Also you may provide new information for further consideration by the Corps to reevaluate the JD.

**SECTION II - REQUEST FOR APPEAL OF OBJECTIONS TO AN INITIAL PROFFERED PERMIT**

**REASONS FOR APPEAL OR OBJECTIONS:** (Describe your reasons for appealing the decision or your objections to an initial proffered permit in clear concise statements. You may attach additional information to this form to clarify where your reasons or objections are addressed in the administrative record.)

**ADDITIONAL INFORMATION:** The appeal is limited to a review of the administrative record, the Corps memorandum for the record of the appeal conference or meeting, and any supplemental information that the review officer has determined is needed to clarify the administrative record. Neither the appellant nor the Corps may add new information or analyses to the record. However, you may provide additional information to clarify the location of information that is already in the administrative record.

**POINT OF CONTACT FOR QUESTIONS OR INFORMATION**

If you have questions regarding this decision and/or the appeal process you may contact:

Mr. Todd Tugwell, Regulatory Specialist  
Raleigh Regulatory Field Office  
6508 Falls of the Neuse Road, Suite 120  
Raleigh, North Carolina 27615

If you only have questions regarding the appeal process you may also contact:

Mr. Arthur Middleton, Administrative Appeal Review Officer  
CESAD-ET-CO-R  
U.S. Army Corps of Engineers, South Atlantic Division  
60 Forsyth Street, Room 9M15  
Atlanta, Georgia 30303-8801

**RIGHT OF ENTRY:** Your signature below grants the right of entry to Corps of Engineers personnel, and any government consultants, to conduct investigations of the project site during the course of the appeal process. You will be provided a 15 day notice of any site investigation, and will have the opportunity to participate in all site investigations.

Signature of appellant or agent.	Date:	Telephone number:
----------------------------------	-------	-------------------

**DIVISION ENGINEER:**

Commander  
U.S. Army Engineer Division, South Atlantic  
60 Forsyth Street, Room 9M15  
Atlanta, Georgia 30303-3490

October 1, 2001

Mr. Todd Tugwell  
U.S. Army Corps of Engineers  
6508 Falls of the Neuse Road, Suite 120  
Raleigh, NC 27615

RE: Highway 55 C&D Landfill  
Wake County, North Carolina

Dear Mr. Tugwell:

The Brigman Company, Inc. has conducted a wetland determination of the referenced project. Based on our reconnaissance the study area was determined to contain areas subject to the jurisdiction of your office.

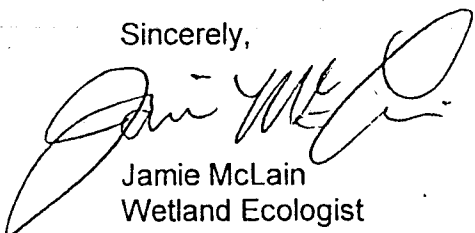
Acting as agent for Griffin Brothers Companies, on the highway 55 C&D Landfill Project, we are requesting an audit and that an wetland verification letter be received.

Enclosed please find a "Request for Concurrence" form along with the following:

- Project Location Map
- Soil Survey
- USGS 7.5 Min. Quadangle
- Upland/ Wetland Determination Sheets

Please notify us when you schedule your on-site inspection so we can be available to accompany you. Should you have any questions or require additional information to facilitate your review, please advise.

Sincerely,



Jamie McLain  
Wetland Ecologist  
cc: Ron Gilkerson

### Request for Wetlands Concurrence

Date: 10/1/2001 County: Wake Latitude: \_\_\_\_\_  
Wetland Acreage: 10 Upland Acreage: 82 Longitude: \_\_\_\_\_  
Project Name: Hwy. 55 C&D Landfill Total Acreage of Tract: 92

Property Owner:  
(name, address, phone):  
Griffin Brothers Companies  
19109 West Catawba Ave. Suite 118  
Cornelius, NC 28031  
Attn: Ron Gilkerson

Agent/Developer/Engineer  
(name, address, phone):  
The Brigman Company, Inc.  
P.O. Box 1532  
Conway, SC 29528  
843-248-9388

Status of Project: (Check One)

- ( ) On-going site work for development purposes.  
(X) Development in planning stages.  
( ) No specific development planned at this time.

Project Type: (Indicate the proposed use of the land in question or, if no specific work is planned at present, indicate the current zoning or land use at the site.)

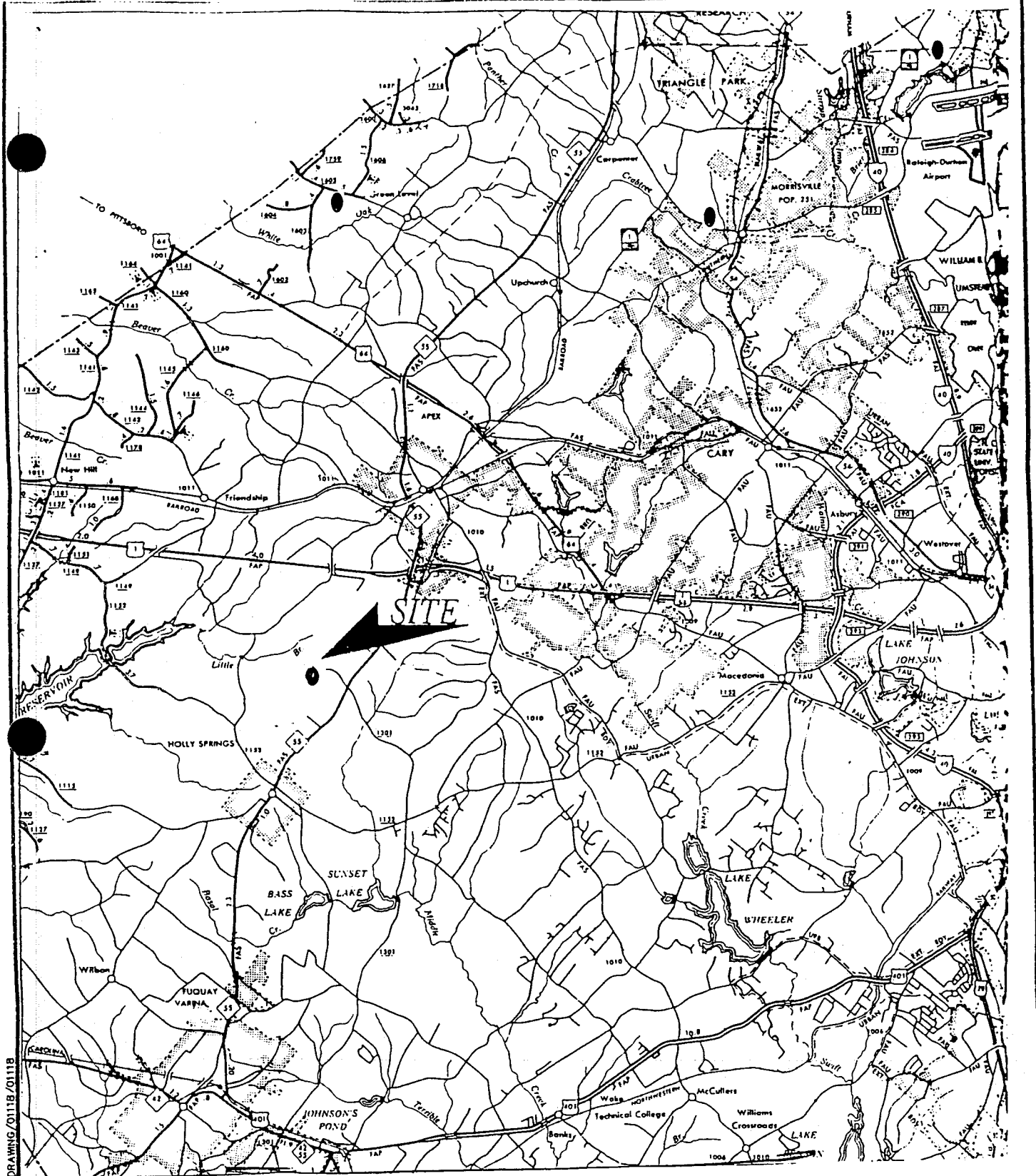
- ( ) Residential ( ) Commercial ( ) Mixed use (resid. & com.)  
( ) Industrial ( ) Agriculture ( ) Public Works  
( ) Silviculture ( ) Aquaculture (X) Other: Landfill

Information Required to Accompany Request: (Check the items submitted. Forward as much information as is available. At a minimum, the first two items must be forwarded.)

- (X) Accurate Location Map (from County Map, USGS Quad Sheet, etc.)  
(X) Soil Survey Sheet (from SCS) or Aerial Photograph (from County Assessors Office or other source - property boundaries shown on soil survey photo would be very helpful.)  
( ) National Wetlands Inventory Map (if available).  
(X) Wetland/Upland Data Sheets  
(X) Survey Plat or Tax Map of the property in question.

Signature of Property Owner or Authorized Agent: \_\_\_\_\_

(The person signing this form must have the authority of the owner to authorize Corps of Engineers employees or their agents to enter onto the property for on-site investigations if such is deemed necessary. Do not sign unless you have the specific authority of the owner.)



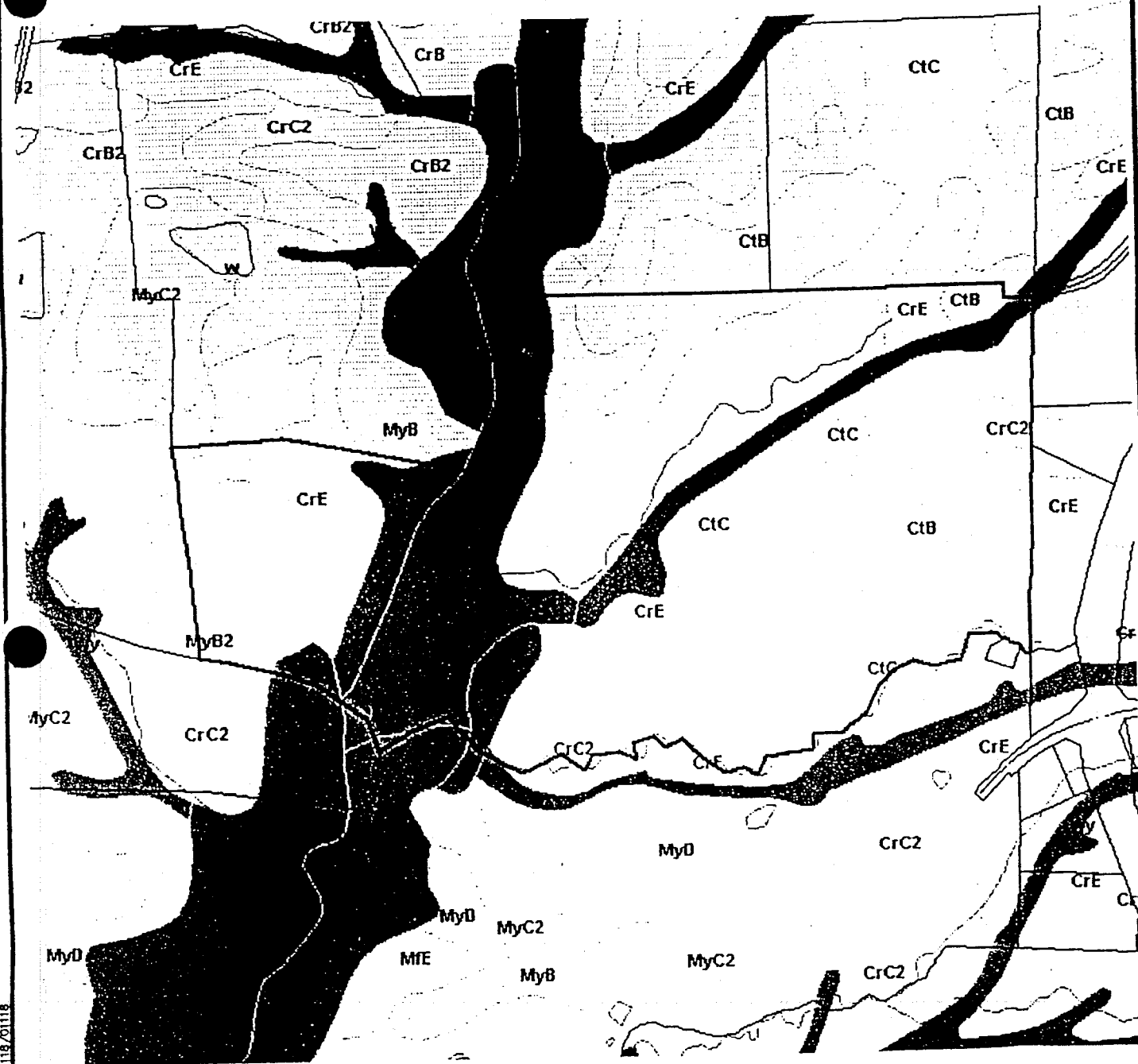
NORTH CAROLINA DEPARTMENT OF TRANSPORTATION  
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**THE**  
**BRIGMAN**  
**COMPANY**  
**INCORPORATED**

# LOCATION MAP

PROJECT/SITE  
 HIGHWAY 55 C&D LANDFILL  
 APPLICANT/OWNER  
 GRIFFIN BROTHERS

SCALE:	1" = 2 MILES
DATE:	9-28-01
JOB NO.:	01118
DWG. NO.:	01118

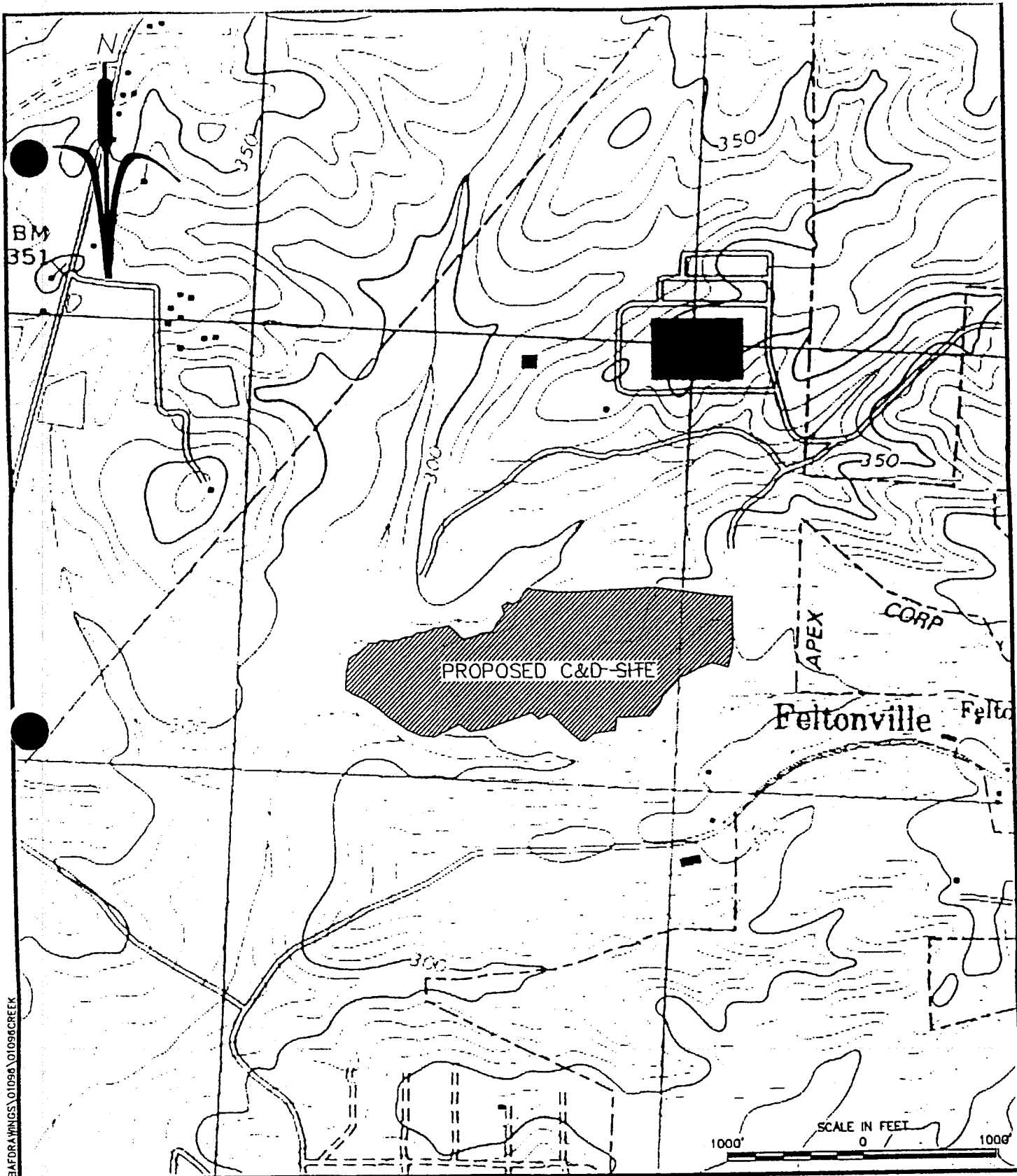


**NORTH CAROLINA GIS DATABASE**

## SOILS SURVEY

01118

AGENT: THE BRIGMAN COMPANY, INC., P.O. BOX 1932, CONWAY SC 29526



G:\BAF\DRAWINGS\01096\01096CREEK

USGS 7.5 MIN QUADRANGLE (APEX QUAD)

THE  
**BRIGMAN**  
COMPANY  
INCORPORATED

AGENT: THE BRIGMAN COMPANY, INC., P.O. BOX 1932, CONWAY SC 29526

### USGS QUADRANGLE

PROJECT/SITE  
**WAKE COUNTY C&D LANDFILL**  
APPLICANT/OWNER  
**GRIFFIN BROTHERS**

SCALE:

1"=1000'

DATE:

8/10/01

JOB NO.:

01096

DWG. NO.:

01096CREEK

(843) 248-9388

FAX: (843) 248-9596

**DATA FORM**  
**ROUTINE WETLAND DETERMINATION**  
**(1987 COE Wetlands Delineation Manual)**

<b>Project/Site:</b> Highway 55 C&D Landfill <b>Applicant/Owner:</b> Griffin Brothers <b>Investigators:</b> The Brigman Company, Inc.	<b>Project No:</b> 01-118	<b>Date:</b> 3-Oct-2001 <b>County:</b> Wake <b>State:</b> North Carolina <b>Plot ID:</b> 1
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<b>Do Normal Circumstances exist on the site?</b> <span style="float: right;"><input checked="" type="radio"/> Yes <input type="radio"/> No</span> <b>Is the site significantly disturbed (Atypical Situation:)?</b> <span style="float: right;"><input type="radio"/> Yes <input checked="" type="radio"/> No</span> <b>Is the area a potential Problem Area?</b> <span style="float: right;"><input type="radio"/> Yes <input checked="" type="radio"/> No</span> (If needed, explain on the reverse side)	<b>Community ID:</b> R2SB <b>Transect ID:</b> <b>Field Location:</b>
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**VEGETATION** (USFWS Region No. 2)

Dominant Plant Species(Latin/Common)	Stratum	Indicator	Plant Species(Latin/Common)	Stratum	Indicator
<i>Acer rubrum</i>	Tree	FAC	<i>Pinus taeda</i>	Tree	FAC
Maple, Red			Pine, Loblolly		
<i>Viburnum dentatum</i>	Tree	FAC	<i>Onoclea sensibilis</i>	Herb	FACW
Arrow-Wood			Fern, Sensitive		
<i>Platanus occidentalis</i>	Tree	FACW-	<i>Polystichum acrostichoides</i>	Herb	FAC
Sycamore, American			Fern, Christmas		
<i>Betula nigra</i>	Tree	FACW	<i>Athyrium pycnocarpon</i>	Herb	FAC
Birch, River			Fern, Narrow-Leaf Lady		

Percent of Dominant Species that are OBL, FACW or FAC: (excluding FAC-) 8/8 = 100.00%	FAC Neutral: 3/3 = 100.00% Numeric Index: 21/8 = 2.63
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**Remarks:**  
 The hydrophytic vegetation criteria was met.

**HYDROLOGY**

<b>NO Recorded Data(Describe in Remarks):</b> <u>N/A</u> Stream, Lake or Tide Gauge <u>N/A</u> Aerial Photographs <u>N/A</u> Other  <b>YES No Recorded Data</b>  <b>Field Observations</b>  Depth of Surface Water: = 3-8" (in.)  Depth to Free Water in Pit: N/A (in.)  Depth to Saturated Soil: = 0 (in.)	<b>Wetland Hydrology Indicators</b> <b>Primary Indicators</b> <u>NO</u> Inundated <u>YES</u> Saturated in Upper 12 Inches <u>YES</u> Water Marks <u>YES</u> Drift Lines <u>YES</u> Sediment Deposits <u>YES</u> Drainage Patterns in Wetlands <b>Secondary Indicators</b> <u>NO</u> Oxidized Root Channels in Upper 12 Inches <u>YES</u> Water-Stained Leaves <u>YES</u> Local Soil Survey Data <u>YES</u> FAC-Neutral Test <u>NO</u> Other(Explain in Remarks)
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**Remarks:**  
 The hydrology criteria was met.

**DATA FORM**  
**ROUTINE WETLAND DETERMINATION**  
**(1987 COE Wetlands Delineation Manual)**

<b>Project/Site:</b> Highway 55 C&D Landfill <b>Applicant/Owner:</b> Griffin Brothers <b>Investigators:</b> The Brigman Company, Inc.	<b>Project No:</b> 01-118	<b>Date:</b> 3-Oct-2001 <b>County:</b> Wake <b>State:</b> North Carolina <b>Plot ID:</b> 1
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**SOILS**

<b>Map Unit Name (Series and Phase):</b> Augusta <b>Map Symbol:</b> Au <b>Drainage Class:</b> Poorly drained <b>Taxonomy (Subgroup):</b> <b>Profile Description</b>				<b>Mapped Hydric Inclusion?</b> <b>Field Observations Confirm Mapped Type?</b> <input checked="" type="radio"/> Yes   No	
Depth (inches)	Horizon	Matrix Color (Munsell Moist)	Mottle Color (Munsell Moist)	Mottle Abundance/Contrast	Texture, Concretions, Structure, etc
0-8"	A	10YR2/2	N/A	N/A   N/A	Sandy loam, Subangular
8"-18"	E	10YR7/1	N/A	N/A   N/A	Sandy clay loam, Subangular blocky

**Hydric Soil Indicators:**  

NO Histosol  
NO Histic Epipedon  
NO Sulfidic Odor  
NO Aquic Moisture Regime  
NO Reducing Conditions  
NO Gleyed or Low Chroma Colors

NO Concretions  
NO High Organic Content in Surface Layer in Sandy Soils  
NO Organic Streaking in Sandy Soils  
YES Listed on Local Hydric Soils List  
YES Listed on National Hydric Soils List  
NO Other (Explain in Remarks)

**Remarks:**  
 The hydric soils criteria was met.

**WETLAND DETERMINATION**

Hydrophytic Vegetation Present? <input checked="" type="radio"/> Yes   No Wetland Hydrology Present? <input checked="" type="radio"/> Yes   No Hydric Soils Present? <input checked="" type="radio"/> Yes   No	Is the Sampling Point within the Wetland? <input checked="" type="radio"/> Yes   No
<b>Remarks:</b> This area meets all the criteria for jurisdictional wetlands.	

**DATA FORM**  
**ROUTINE WETLAND DETERMINATION**  
**(1987 COE Wetlands Delineation Manual)**

<b>Project/Site:</b> Highway 55 C&D Landfill <b>Applicant/Owner:</b> Griffin Brothers <b>Investigators:</b> The Brigman Company, Inc.	<b>Project No:</b> 01-118	<b>Date:</b> 3-Oct-2001 <b>County:</b> Wake <b>State:</b> North Carolina <b>Plot ID:</b> 2
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<b>Do Normal Circumstances exist on the site?</b> <span style="margin-left: 20px;"><input checked="" type="radio"/> Yes <input type="radio"/> No</span> <b>Is the site significantly disturbed (Atypical Situation)?</b> <span style="margin-left: 20px;"><input type="radio"/> Yes <input checked="" type="radio"/> No</span> <b>Is the area a potential Problem Area?</b> <span style="margin-left: 20px;"><input type="radio"/> Yes <input checked="" type="radio"/> No</span> (If needed, explain on the reverse side)	<b>Community ID:</b> Upland <b>Transect ID:</b> <b>Field Location:</b>
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(USFWS Region No. 2)					
Dominant Plant Species(Latin/Common)	Stratum	Indicator	Plant Species(Latin/Common)	Stratum	Indicator
<i>Cornus florida</i>	Tree	FACU	<i>Quercus nigra</i>	Tree	FAC
Dogwood, Flowering			Oak, Water		
<i>Pinus taeda</i>	Tree	FAC	<i>Pteridium aquilinum</i>	Herb	FACU
Pine, Loblolly			Fern, Bracken		
<i>Liquidambar styraciflua</i>	Tree	FAC+	<i>Vitis rotundifolia</i>	Vine	FAC
Gum, Sweet			Grape, Muscadine		
<i>Acer rubrum</i>	Tree	FAC	<i>Smilax rotundifolia</i>	Vine	FAC
Maple, Red			Greenbrier, Common		

<b>Percent of Dominant Species that are OBL, FACW or FAC:</b> (excluding FAC-) 6/8 = 75.00%	<b>FAC Neutral:</b> 0/2 = 0.00% <b>Numeric Index:</b> 26/8 = 3.25
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**Remarks:**  
 The hydrophytic vegetation criteria was met.

**HYDROLOGY**

<b>NO Recorded Data(Describe in Remarks):</b> <u>N/A</u> Stream, Lake or Tide Gauge <u>N/A</u> Aerial Photographs <u>N/A</u> Other  <b>YES No Recorded Data</b>  <b>Field Observations</b>  Depth of Surface Water: N/A (in.)  Depth to Free Water in Pit: N/A (in.)  Depth to Saturated Soil: N/A (in.)	<b>Wetland Hydrology Indicators</b> <b>Primary Indicators</b> <u>NO</u> Inundated <u>NO</u> Saturated in Upper 12 Inches <u>NO</u> Water Marks <u>NO</u> Drift Lines <u>NO</u> Sediment Deposits <u>NO</u> Drainage Patterns in Wetlands <b>Secondary Indicators</b> <u>NO</u> Oxidized Root Channels in Upper 12 Inches <u>NO</u> Water-Stained Leaves <u>NO</u> Local Soil Survey Data <u>NO</u> FAC-Neutral Test <u>NO</u> Other(Explain in Remarks)
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**Remarks:**  
 The hydrology criteria was not met.

DATA FORM  
**ROUTINE WETLAND DETERMINATION**  
*(1987 COE Wetlands Delineation Manual)*

<b>Project/Site:</b> Highway 55 C&D Landfill <b>Applicant/Owner:</b> Griffin Brothers <b>Investigators:</b> The Brigman Company, Inc.	<b>Project No:</b> 01-118	<b>Date:</b> 3-Oct-2001 <b>County:</b> Wake <b>State:</b> North Carolina <b>Plot ID:</b> 2
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**SOILS**

<b>Map Unit Name (Series and Phase):</b> Creedmore <b>Map Symbol:</b> CtB <b>Drainage Class:</b> Well drained <b>Taxonomy (Subgroup):</b> <b>Profile Description</b>				<b>Mapped Hydric Inclusion?</b> <b>Field Observations Confirm Mapped Type?</b> <input checked="" type="radio"/> Yes <input type="radio"/> No	
Depth (Inches)	Horizon	Matrix Color (Munsell Moist)	Mottle Color (Munsell Moist)	Mottle Abundance/Contrast	Texture, Concretions, Structure, etc
0-6"	A	10YR4/3	N/A	N/A   N/A	Clay loam, Subangular blocky
6"-18"	E	10YR5/4	N/A	N/A   N/A	Clay loam, Subangular blocky

**Hydric Soil Indicators:**

<u>NO</u> Histosol <u>NO</u> Histic Epipedon <u>NO</u> Sulfidic Odor <u>NO</u> Aquic Moisture Regime <u>NO</u> Reducing Conditions <u>NO</u> Gleyed or Low Chroma Colors	<u>NO</u> Concretions <u>NO</u> High Organic Content in Surface Layer in Sandy Soils <u>NO</u> Organic Streaking in Sandy Soils <u>NO</u> Listed on Local Hydric Soils List <u>NO</u> Listed on National Hydric Soils List <u>NO</u> Other (Explain in Remarks)
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**Remarks:**  
 The hydric soils criteria was not meet.

**WETLAND DETERMINATION**

Hydrophytic Vegetation Present? <input checked="" type="radio"/> Yes <input type="radio"/> No Wetland Hydrology Present?         Yes <input checked="" type="radio"/> No Hydric Soils Present?                 Yes <input checked="" type="radio"/> No	Is the Sampling Point within the Wetland?    Yes <input checked="" type="radio"/> No
<b>Remarks:</b> This area does not meet all the criteria for jurisdictional wetlands.	

THE  
BRIGMAN  
COMPANY  
INCORPORATED

ENVIRONMENTAL SERVICES

P.O. BOX 1532

CONWAY, SC 29525

(843) 248-9383

FAX (843) 248-9596

wetlandman@aol.com

October 4, 2001

Todd Tugwell  
US Army Corps Of Engineers  
Raleigh Regulatory Field Office  
6508 Falls of the Neuse Road  
Suite 120  
Raleigh, NC 27615

RE: Highway 55 C&D Landfill, LLC  
Proposed Hwy 55 C&D Landfill & Recycling Center  
Wake County, North Carolina

Dear Mr. Tugwell:

The Brigman Company, Inc., acting as agent for the applicant, seeks the issuance of a Nationwide Permit # 39 to accomplish the deposition of fill within Waters of the US required to construct the referenced project and fulfill NCDENR requirements.

Enclosed herewith the application, is the following supporting information:

- Project Location Map
- USGS Quadrangle
- Wetland Master Plan

If you have any questions concerning the application or require additional information to complete the approval process, please do not hesitate to call me.

Sincerely,



Britt A. Feldner  
Project Manager

cc: Ron Gilkerson  
John Domey - NCDENR

**Office Use Only:**

Form Version April 2001

USACE Action ID No. \_\_\_\_\_ DWQ No. \_\_\_\_\_

If any particular item is not applicable to this project, please enter "Not Applicable" or "N/A" rather than leaving the space blank.

**I. Processing**

1. Check all of the approval(s) requested for this project:

- ☒ Section 404 Permit  
☐ Section 10 Permit  
☒ 401 Water Quality Certification  
☐ Riparian or Watershed Buffer Rules

2. Nationwide, Regional or General Permit Number(s) Requested: 39
3. If this notification is solely a courtesy copy because written approval for the 401 Certification is not required, check here: ☐
4. If payment into the North Carolina Wetlands Restoration Program (NCWRP) is proposed for mitigation of impacts (see section VIII – Mitigation), check here: ☐

**II. Applicant Information**

1. Owner/Applicant Information

Name: Highway 55 C&D Landfill, LLC  
Mailing Address: 19109 West Catawba Ave.  
Suite 118  
Cornelius, NC 28031

Telephone Number: (843) 248-9388 Fax Number: (843) 248-9596  
E-mail Address: wetlandman@aol.com

2. Agent Information (A signed and dated copy of the Agent Authorization letter must be attached if the Agent has signatory authority for the owner/applicant.)

Name: Britt A. Feldner  
Company Affiliation: The Brigman Company, Inc.  
Mailing Address: 900B Main Street  
Conway, SC 29526

Telephone Number: (843) 248-9388 Fax Number: (843) 248-9596  
E-mail Address: wetlandman@aol.com

### III. Project Information

Attach a **vicinity map** clearly showing the location of the property with respect to local landmarks such as towns, rivers, and roads. Also provide a detailed **site plan** showing property boundaries and development plans in relation to surrounding properties. Both the vicinity map and site plan must include a scale and north arrow. The specific footprints of all buildings, impervious surfaces, or other facilities must be included. If possible, the maps and plans should include the appropriate USGS Topographic Quad Map and NRCS Soil Survey with the property boundaries outlined. Plan drawings, or other maps may be included at the applicant's discretion, so long as the property is clearly defined. For administrative and distribution purposes, the USACE requires information to be submitted on sheets no larger than 11 by 17-inch format; however, DWQ may accept paperwork of any size. DWQ prefers full-size construction drawings rather than a sequential sheet version of the full-size plans. If full-size plans are reduced to a small scale such that the final version is illegible, the applicant will be informed that the project has been placed on hold until decipherable maps are provided.

1. Name of project: Highway 55 C&D Landfill & Recycling Center
2. T.I.P. Project Number (NCDOT Only): \_\_\_\_\_
3. Property Identification Number (Tax PIN): 0740.02-55-8687
4. Location  
County: Wake Nearest Town: Apex  
Subdivision name (include phase/lot number): \_\_\_\_\_  
Directions to site (include road numbers, landmarks, etc.): Travel north on highway 55 from Holly Springs in Wake County approximately 2 miles and turn left on to Old Smithfield Road (Hwy 1172) traveling about ½ miles and the site is on the right.
5. Site coordinates, if available (UTM or Lat/Long): Lat: 35°41'10" Long: 78°50'40"  
(Note – If project is linear, such as a road or utility line, attach a sheet that separately lists the coordinates for each crossing of a distinct waterbody.)
6. Describe the existing land use or condition of the site at the time of this application: The site consist of mostly 15 to 20 year old Loblolly pines with some shortleaf pine and mixed hardwoods.
7. Property size (acres): 89.1
8. Nearest body of water (stream/river/sound/ocean/lake): Little Branch
9. River Basin: Cape Fear River Basin  
(Note – this must be one of North Carolina's seventeen designated major river basins. The River Basin map is available at <http://h2o.enr.state.nc.us/admin/maps/>.)

10. Describe the purpose of the proposed work: The purpose of the proposed work is to  
Construct a C&D Landfill and Recycling Center.

11. List the type of equipment to be used to construct the project: Typical land grading  
Equipment: back-hoe, trac-hoe and bulldozers etc.

12. Describe the land use in the vicinity of this project: Commercial

#### IV. Prior Project History

If jurisdictional determinations and/or permits have been requested and/or obtained for this project (including all prior phases of the same subdivision) in the past, please explain. Include the USACE Action ID Number, DWQ Project Number, application date, and date permits and certifications were issued or withdrawn. Provide photocopies of previously issued permits, certifications or other useful information. Describe previously approved wetland, stream and buffer impacts, along with associated mitigation (where applicable). If this is a NCDOT project, list and describe permits issued for prior segments of the same T.I.P. project, along with construction schedules.

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#### V. Future Project Plans

Are any additional permit requests anticipated for this project in the future? If so, describe the anticipated work, and provide justification for the exclusion of this work from the current application: At this time we are unable to determine any definite future impacts to wetlands or  
Waters of the United States.

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#### VI. Proposed Impacts to Waters of the United States/Waters of the State

It is the applicant's (or agent's) responsibility to determine, delineate and map all impacts to wetlands, open water, and stream channels associated with the project. The applicant must also provide justification for these impacts in Section VII below. All proposed impacts, permanent and temporary, must be listed herein, and must be clearly identifiable on an accompanying site plan. All wetlands and waters, and all streams (intermittent and perennial) must be shown on a delineation map, whether or not impacts are proposed to these systems. Wetland and stream evaluation and delineation forms should be included as appropriate. Photographs may be included at the applicant's discretion. If this proposed impact is strictly for wetland or stream mitigation, list

and describe the impact in Section VIII below. If additional space is needed for listing or description, please attach a separate sheet.

1. Wetland Impacts

Wetland Impact Site Number (indicate on map)	Type of Impact*	Area of Impact (acres)	Located within 100-year Floodplain** (yes/no)	Distance to Nearest Stream (linear feet)	Type of Wetland***

\* List each impact separately and identify temporary impacts. Impacts include, but are not limited to: mechanized clearing, grading, fill, excavation, flooding, ditching/drainage, etc. For dams, separately list impacts due to both structure and flooding.

\*\* 100-Year floodplains are identified through the Federal Emergency Management Agency's (FEMA) Flood Insurance Rate Maps (FIRM), or FEMA-approved local floodplain maps. Maps are available through the FEMA Map Service Center at 1-800-358-9616, or online at <http://www.fema.gov>.

\*\*\* List a wetland type that best describes wetland to be impacted (e.g., freshwater/saltwater marsh, forested wetland, beaver pond, Carolina Bay, bog, etc.)

List the total acreage (estimated) of existing wetlands on the property: +/- 4.3 acres

Total area of wetland impact proposed: 0

2. Stream Impacts, including all intermittent and perennial streams

Stream Impact Site Number (indicate on map)	Type of Impact*	Length of Impact (linear feet)	Stream Name**	Average Width of Stream Before Impact	Perennial or Intermittent? (please specify)
1	Culv. Rd X-sing	30	N/A	15	Perennial
2	Culv. Rd X-sing	25	N/A	5	Intermittent
3	Fill	64	N/A	5	Intermittent
4	Culv. Rd X-sing	15	N/A	20	Perennial
5	Culv. Rd X-sing	15	Little Branch	25	Perennial

\* List each impact separately and identify temporary impacts. Impacts include, but are not limited to: culverts and associated rip-rap, dams (separately list impacts due to both structure and flooding), relocation (include linear feet before and after, and net loss/gain), stabilization activities (cement wall, rip-rap, crib wall, gabions, etc.), excavation, ditching/straightening, etc. If stream relocation is proposed, plans and profiles showing the linear footprint for both the original and relocated streams must be included.

Stream names can be found on USGS topographic maps. If a stream has no name, list as UT (unnamed tributary) to the nearest downstream named stream into which it flows. USGS maps are available through the USGS at 1-800-358-9616, or online at [www.usgs.gov](http://www.usgs.gov). Several internet sites also allow direct download and printing of USGS maps (e.g., [www.topozone.com](http://www.topozone.com), [www.mapquest.com](http://www.mapquest.com), etc.).

Cumulative impacts (linear distance in feet) to all streams on site: 149

3. Open Water Impacts, including Lakes, Ponds, Estuaries, Sounds, Atlantic Ocean and any other Water of the U.S.

Open Water Impact Site Number (indicate on map)	Type of Impact*	Area of Impact (acres)	Name of Waterbody (if applicable)	Type of Waterbody (lake, pond, estuary, sound, bay, ocean, etc.)

\* List each impact separately and identify temporary impacts. Impacts include, but are not limited to: fill, excavation, dredging, flooding, drainage, bulkheads, etc.

#### 4. Pond Creation

If construction of a pond is proposed, associated wetland and stream impacts should be included above in the wetland and stream impact sections. Also, the proposed pond should be described here and illustrated on any maps included with this application.

Pond to be created in (check all that apply): ☐ uplands ☐ stream ☐ wetlands  
Describe the method of construction (e.g., dam/embankment, excavation, installation of draw-down valve or spillway, etc.): N/A

Proposed use or purpose of pond (e.g., livestock watering, irrigation, aesthetic, trout pond, local stormwater requirement, etc.): N/A

Size of watershed draining to pond: \_\_\_\_\_ Expected pond surface area: \_\_\_\_\_

## VII. Impact Justification (Avoidance and Minimization)

Specifically describe measures taken to avoid the proposed impacts. It may be useful to provide information related to site constraints such as topography, building ordinances, accessibility, and financial viability of the project. The applicant may attach drawings of alternative, lower-impact site layouts, and explain why these design options were not feasible. Also discuss how impacts were minimized once the desired site plan was developed. If applicable, discuss construction techniques to be followed during construction to reduce impacts.

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### VIII. Mitigation

DWQ - In accordance with 15A NCAC 2H .0500, mitigation may be required by the NC Division of Water Quality for projects involving greater than or equal to one acre of impacts to freshwater wetlands or greater than or equal to 150 linear feet of total impacts to perennial streams.

USACE – In accordance with the Final Notice of Issuance and Modification of Nationwide Permits, published in the Federal Register on March 9, 2000, mitigation will be required when necessary to ensure that adverse effects to the aquatic environment are minimal. Factors including size and type of proposed impact and function and relative value of the impacted aquatic resource will be considered in determining acceptability of appropriate and practicable mitigation as proposed. Examples of mitigation that may be appropriate and practicable include, but are not limited to: reducing the size of the project; establishing and maintaining wetland and/or upland vegetated buffers to protect open waters such as streams; and replacing losses of aquatic resource functions and values by creating, restoring, enhancing, or preserving similar functions and values, preferable in the same watershed.

If mitigation is required for this project, a copy of the mitigation plan must be attached in order for USACE or DWQ to consider the application complete for processing. Any application lacking a required mitigation plan or NCWRP concurrence shall be placed on hold as incomplete. An applicant may also choose to review the current guidelines for stream restoration in DWQ's Draft Technical Guide for Stream Work in North Carolina, available at <http://h2o.enr.state.nc.us/ncwetlands/strmgide.html>.

1. Provide a brief description of the proposed mitigation plan. The description should provide as much information as possible, including, but not limited to: site location (attach directions and/or map, if offsite), affected stream and river basin, type and amount (acreage/linear feet) of mitigation proposed (restoration, enhancement, creation, or preservation), a plan view, preservation mechanism (e.g., deed restrictions, conservation easement, etc.), and a description of the current site conditions and proposed method of construction. Please attach a separate sheet if more space is needed.

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2. Mitigation may also be made by payment into the North Carolina Wetlands Restoration Program (NCWRP) with the NCWRP's written agreement. Check the box indicating that you would like to pay into the NCWRP. Please note that payment into the NCWRP must be reviewed and approved before it can be used to satisfy mitigation requirements. Applicants will be notified early in the review process by the 401/Wetlands Unit if payment into the NCWRP is available as an option. For additional information regarding the application process for the NCWRP, check the NCWRP website at <http://h2o.enr.state.nc.us/wrp/index.htm>. If use of the NCWRP is proposed, please check the appropriate box on page three and provide the following information:

Amount of stream mitigation requested (linear feet): \_\_\_\_\_  
Amount of buffer mitigation requested (square feet): \_\_\_\_\_  
Amount of Riparian wetland mitigation requested (acres): \_\_\_\_\_  
Amount of Non-riparian wetland mitigation requested (acres): \_\_\_\_\_  
Amount of Coastal wetland mitigation requested (acres): \_\_\_\_\_

**X. Environmental Documentation (DWQ Only)**

Does the project involve an expenditure of public funds or the use of public (federal/state/local) land?

Yes ☐ No ☒

If yes, does the project require preparation of an environmental document pursuant to the requirements of the National or North Carolina Environmental Policy Act (NEPA/SEPA)? Note: If you are not sure whether a NEPA/SEPA document is required, call the SEPA coordinator at (919) 733-5083 to review current thresholds for environmental documentation.

Yes ☐ No ☐

If yes, has the document review been finalized by the State Clearinghouse? If so, please attach a copy of the NEPA or SEPA final approval letter.

Yes ☐ No ☐

**X. Proposed Impacts on Riparian and Watershed Buffers (DWQ Only)**

It is the applicant's (or agent's) responsibility to determine, delineate and map all impacts to required state and local buffers associated with the project. The applicant must also provide justification for these impacts in Section VII above. All proposed impacts must be listed herein, and must be clearly identifiable on the accompanying site plan. All buffers must be shown on a map, whether or not impacts are proposed to the buffers. Correspondence from the DWQ

Regional Office may be included as appropriate. Photographs may also be included at the applicant's discretion.

Will the project impact protected riparian buffers identified within 15A NCAC 2B .0233 (Neuse), 15A NCAC 2B .0259 (Tar-Pamlico), 15A NCAC 2B .0250 (Randleman Rules and Water Supply Buffer Requirements), or other (please identify \_\_\_\_\_)?

Yes ☐

No ☒

If you answered "yes", provide the following information:

Identify the square feet and acreage of impact to each zone of the riparian buffers. If buffer mitigation is required calculate the required amount of mitigation by applying the buffer multipliers.

Zone*	Impact (square feet)	Multiplier	Required Mitigation
1		3	
2		1.5	
Total			

\* Zone 1 extends out 30 feet perpendicular from near bank of channel; Zone 2 extends an additional 20 feet from the edge of Zone 1.

If buffer mitigation is required, please discuss what type of mitigation is proposed (i.e., Donation of Property, Conservation Easement, Riparian Buffer Restoration / Enhancement, Preservation or Payment into the Riparian Buffer Restoration Fund). Please attach all appropriate information as identified within 15A NCAC 2B .0242 or .0260.

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#### XI. Stormwater (DWQ Only)

Describe impervious acreage (both existing and proposed) versus total acreage on the site. Discuss stormwater controls proposed in order to protect surface waters and wetlands downstream from the property.

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#### XII. Sewage Disposal (DWQ Only)

Clearly detail the ultimate treatment methods and disposition (non-discharge or discharge) of wastewater generated from the proposed project, or available capacity of the subject facility.

Water and Sewer for the facility will be met by the use of a port-a-john and bottled water  
For construction. The town of Apex water and sewer will be utilized once the facility is opened.

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**XIII. Violations (DWQ Only)**

Is this site in violation of DWQ Wetland Rules (15A NCAC 2H .0500) or any Buffer Rules?

Yes ☐

No ☒

Is this an after-the-fact permit application?

Yes ☒

No ☐

**XIV. Other Circumstances (Optional):**

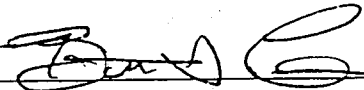
It is the applicant's responsibility to submit the application sufficiently in advance of desired construction dates to allow processing time for these permits. However, an applicant may choose to list constraints associated with construction or sequencing that may impose limits on work schedules (e.g., draw-down schedules for lakes, dates associated with Endangered and Threatened Species, accessibility problems, or other issues outside of the applicant's control).

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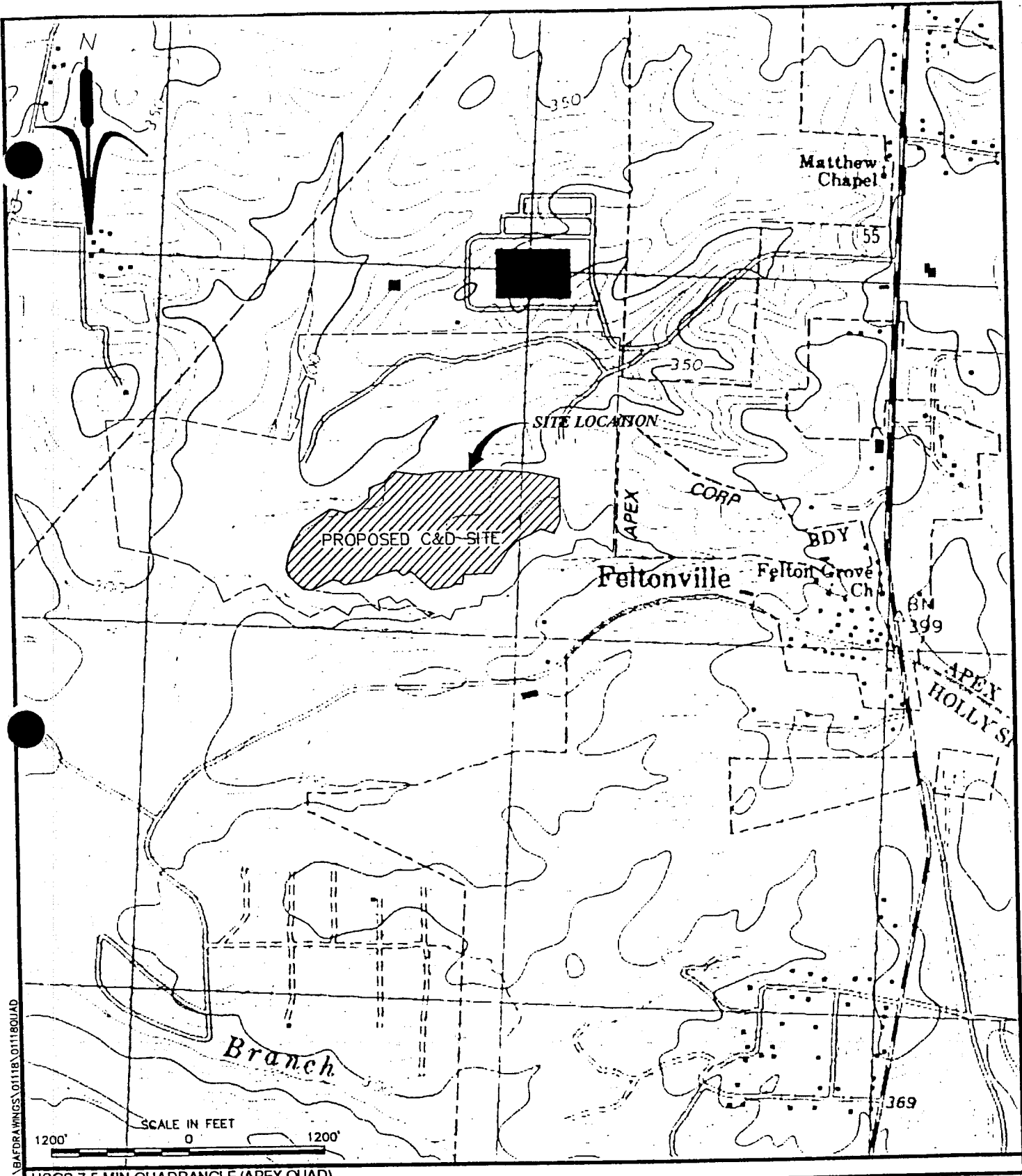


Applicant/Agent's Signature

10/9/01

Date

(Agent's signature is valid only if an authorization letter from the applicant is provided.)



C:\BAF\DRAWINGS\01118\01118QUAD

USGS 7.5 MIN QUADRANGLE (APEX QUAD)

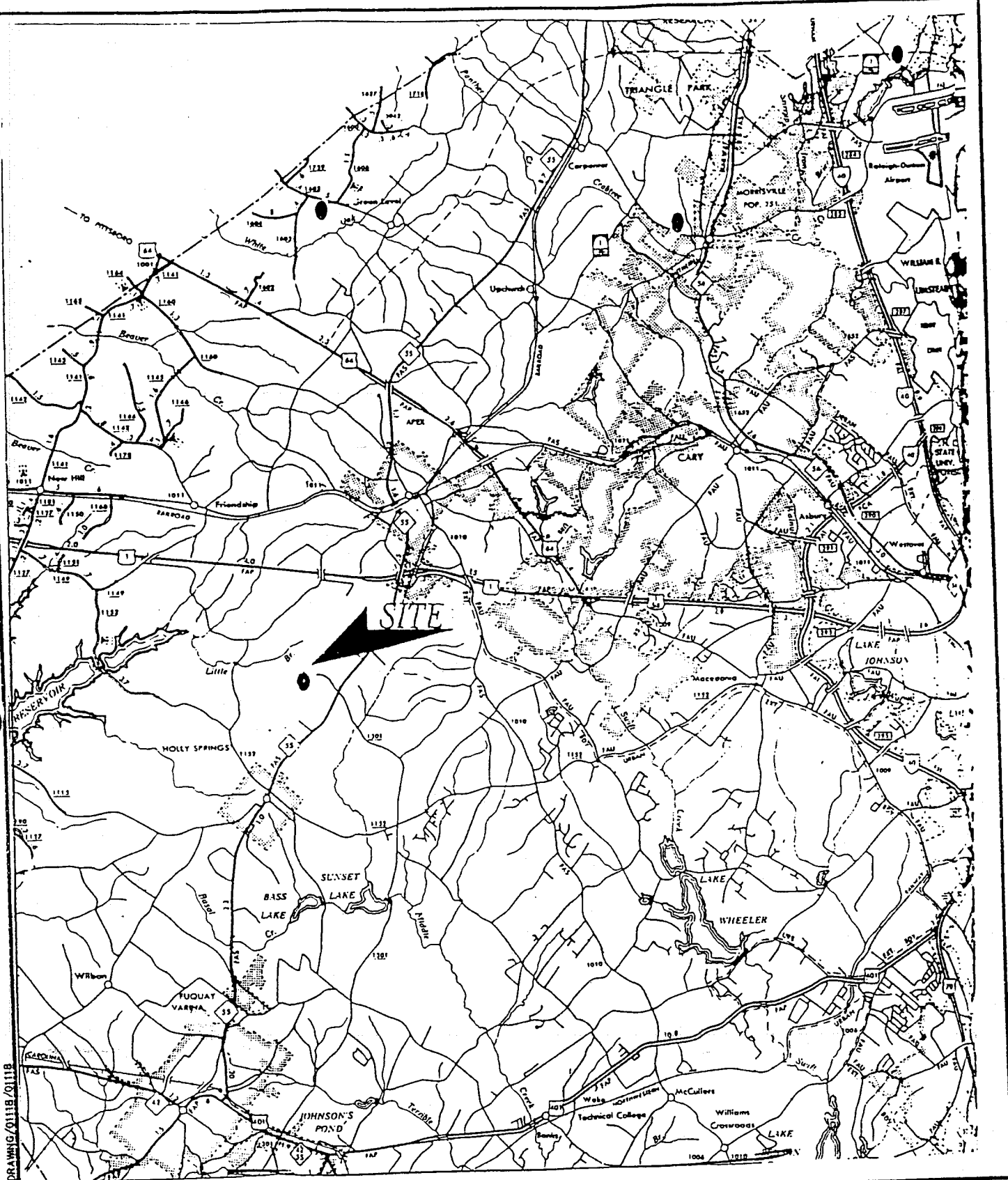
THE  
BRIGMAN  
COMPANY  
INCORPORATED

AGENT: THE BRIGMAN COMPANY, INC., P.O. BOX 1932, CONWAY SC 29526

USGS QUADRANGLE	
PROJECT/SITE	PROPOSED HIGHWAY 55 C&D LANDFILL
APPLICANT/OWNER	HWY 55 C&D LANDFILL, LLC

SCALE:	1"=1200'
DATE:	8/10/01
JOB NO.:	01118
DWG. NO.:	01118QUAD

(843) 248-9388 FAX: (843) 248-9596



C:\DRAWING\01118\01118

NORTH CAROLINA DEPARTMENT OF TRANSPORTATION

**THE BRIGMAN  
COMPANY  
INCORPORATED**

AGENT: THE BRIGMAN COMPANY, INC., P.O. BOX 1932, CONWAY SC 29526

## LOCATION MAP

PROJECT/SITE  
**HIGHWAY 55 C&D LANDFILL**  
APPLICANT/OWNER  
**GRIFFIN BROTHERS**

SCALE:

1" = 2 MILES

DATE:

9-28-01

JOB NO.:

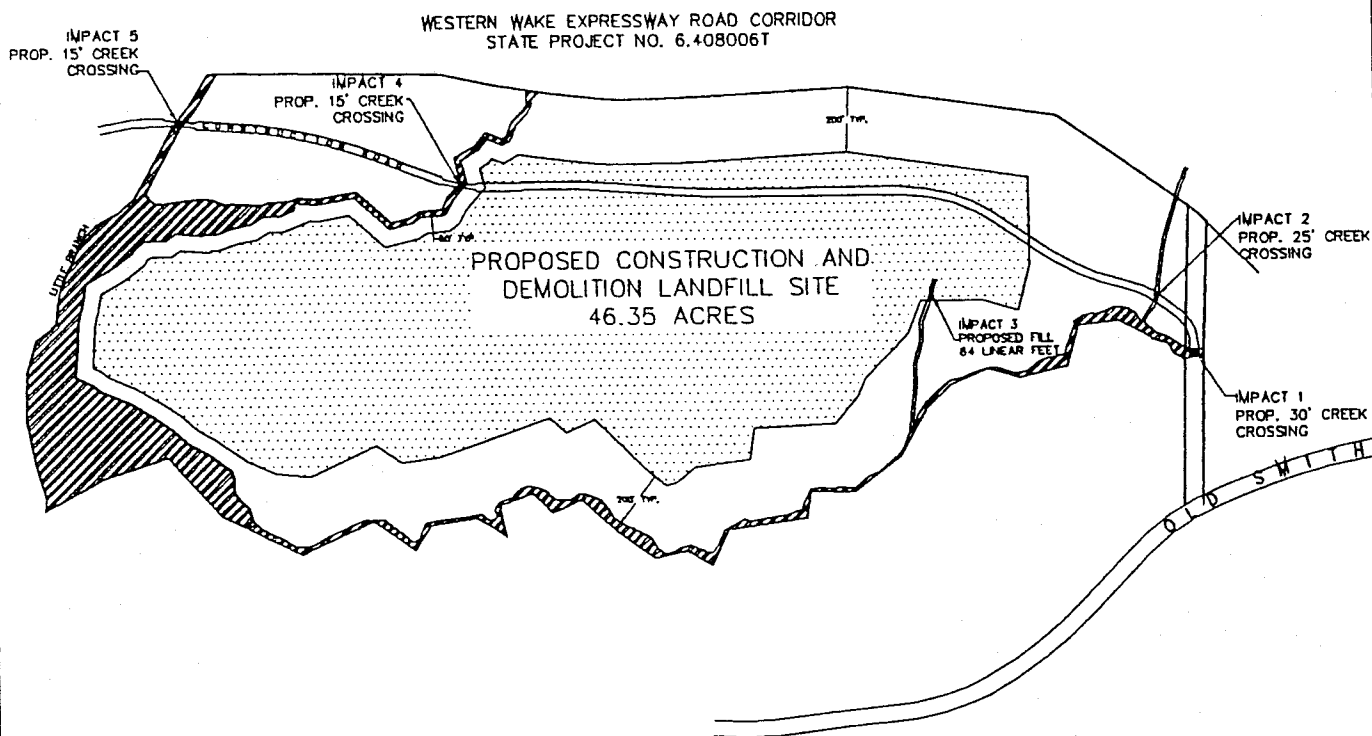
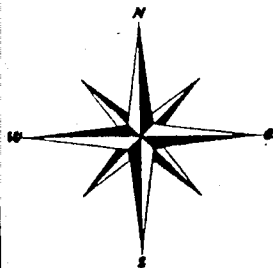
01118

DWG. NO.:

01118

(843) 248-9388

FAX: (843) 248-9596



SCALE IN FEET  
600' 0 600'

TOTAL PROP. AREA	89.10 ACRES
WETLANDS/WATERS	8.11 ACRES
CREEK FILL (FEET)	149 FEET

LAT: 35D41'10" LONG: 78D50'40"

# WETLAND MASTER PLAN

## PROPOSED HIGHWAY 55 C&D LANDFILL

### WAKE COUNTY, NORTH CAROLINA

#### NATIONWIDE PERMIT #14 APPLICATION

DATE: 10/2/01

PAGE 3/3

APPLICATION NO. \_\_\_\_\_

PROPOSED ACTIVITY:	WATERS/WETLAND FILL
PURPOSE:	C&D LANDFILL
LOCATION:	APEX COMMUNITY
APPLICANT:	GRIFFIN BROTHERS COMPANIES

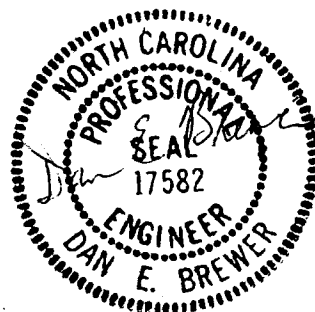
AGENT: THE BRIGMAN COMPANY, INC., P.O. BOX 1932, CONWAY SC 29526 (843) 248-9388 FAX: (843) 248-9596

**CONSTRUCTION PLAN APPLICATION  
HIGHWAY 55 C&D LANDFILL & RECYCLING CENTER  
WAKE COUNTY, NORTH CAROLINA**

Prepared for:  
NCDEHNR  
Solid Waste Section  
Raleigh, North Carolina

Prepared by:  
  
Patterson, Brewer & Associates, P.A.  
P.O. Box 1387  
Mooresville, North Carolina 28115

May 6, 2002



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## APPENDICES

## **1.0 INTRODUCTION**

### **1.1 Project Description**

On behalf of Highway 55 C&D Landfill, LLC, Patterson, Brewer & Associates, P.A. herewith submits this Application for a Permit to Construct the Highway 55 C&D Landfill & Recycling Center, Phase 1. This application meets the landfill design parameters, construction requirements and design drawings as required by Rule .0504(2) of 15A NCAC 13B of the North Carolina Solid Waste Management Rules. The design drawings are submitted under separate cover. Included in this report is information regarding the site design, construction, operation, and closure of the proposed facility. The Proposed Highway 55 C&D Landfill & Recycling Center is located off Old Smith Field Road and the new Highway 55 Bypass, in the southwest portion of Wake County, NC.

The landfill property encompasses 88.6 acres of which approximately 43 acres will be utilized for landfilling operations. The property is owned by Highway 55 C&D Landfill, LLC and will be operated by Griffin Brothers Landfill Division. The Regional Operations Manager responsible for the operations and maintenance of the site will be Mr. Roger Barnes and the assistant site manager will be Mr. Steve Blossom.

The C&D landfill will service Wake County. The waste stream will consist of waste resulting from the clearing, construction, remodeling, and repair or demolition operations on pavement, buildings or other structures.

The reprocessing/recycling center will be operated for the Town of Apex and Wake County residents. The reprocessing/recycling center will include a 1.0 acre paved drop-off area for separated materials such as inert debris (concrete, brick, block, rock and clean soil), land clearing debris, and yard waste materials collected by the Town of Apex. The reprocessing site includes 4.2 acres in the northeast section of the property

## **1.2 Site Conditions**

The landfill property consists mainly of woodlands. Ground surface elevation range from approximately 358 feet (MSL) in the eastern portion of the site to approximately 274 feet (MSL) along Little Branch, which flows south along the western landfill property boundary. Falls Branch flows west along the southern landfill boundary. The Proposed Western Wake Expressway Road Corridor forms the northern landfill boundary. Based on the FEMA floodway maps, there is no 100-year flood plain located on the subject property. A 100-year floodplain is located along Little Branch just off-site to the south of the southwestern property corner. Floodplain areas can be reviewed from USACOE/FEMA Restudy Worksheet Nos. 296, 297, 317, and 318 and FEMA FIRM Panel Nos. 0490, 0495, 0675, and 0660 Branch Creek.

## **2.0 LANDFILL DESIGN**

### **2.1 Site Development**

The C&D landfill consists of three phases. Phase 1 is designed with a capacity of approximately five years. Each phase will have an exterior perimeter berm varying in height from 2 to 10 feet in height. The exterior perimeter berms are located along the outside edge of each phase. The perimeter berms will prevent run-on from entering the landfill during development. All fill placement for the berms will be compacted to a minimum of 95 percent of the standard Proctor maximum dry density. The berms will be constructed with on-site borrow material.

A 200-foot buffer will be maintained around the entire perimeter. A 50-foot buffer will be maintained from Little Branch, which flows across the northern and western portion of the property. A 500-foot buffer will be maintained from existing residences and water supply wells. The majority of the areas within the buffer will remain wooded.

Area fill will be required only in a small area in the western section of Phase 1. Unsuitable soils encountered in these areas will be undercut prior to placing compacted earth fill. Replacement of suitable structural fill material within the undercut areas will reduce localized settlement within the filled areas.

Each phase will be constructed with a minimum one percent base grade. The subgrade, as shown on the Site Grading Plan, will be a minimum of four feet above the estimated seasonal high groundwater level and four feet above bedrock. Based on the Site Plan Application Report, excavation will be allowed within most of the landfill footprint. Sufficient quantities of borrow material for construction is available from excavation within the landfill. Excavated material will be stockpiled for future use as weekly, intermediate, and final cover.

Surface water control structures are to be sized in accordance with the North Carolina Erosion and Sedimentation Pollution Control Act. Surface water control structures located downgradient of the landfill are designed to handle a 25 year, 24-hour maximum storm event.

Access roads will be provided around the landfill perimeter for maintenance. Temporary access roads will be constructed throughout the operation of the landfill. The roads will be approximately 24 feet wide with side ditches to prevent erosion of the roadway surface. The main haul road that extends east to west will be surfaced with asphalt to provide all weather access and limit dust.

Auxiliary facilities to be constructed, as shown on the Entrance Area Grading Plan include the scale house, scales, maintenance and administrative building, access road and erosion and sediment control structures for operation of Phase 1.

Final cover elevations, as shown on the Final Closure Plan will be sloped no steeper than 3H:1V (horizontal to vertical) with erosion control benches. The final cover will include an 18-inch thick compacted soil layer with a 6-inch thick topsoil layer.

## **2.2 Landfill Operation**

The landfill will be operated from the upgradient end to the downgradient end so that stormwater that falls into an active area will be routed to the erosion and sediment control structures.

Waste acceptance and operational procedures are presented in the C&D Landfill Operations and Maintenance Plan, Section 6.0.

Closure of phases will commence once final elevations are reached. Partial closure of phases may be implemented during landfill operations. Site phasing diagrams are presented in the C&D Landfill Operations and Maintenance Plan, Section 6.0.

### **2.3 Weekly/Intermediate Cover**

The weekly cover will be a minimum 6-inch thick layer of soil placed over the active face of the landfill. The weekly cover promotes surface water runoff and reduces nuisances caused by odors, vectors, etc. Cover soils will be placed on landfilled areas to the proposed finished grades.

A 12-inch thick intermediate layer of soil will be placed on landfill areas that are exposed for more than 30 days and on areas where final waste placement areas have been achieved. Also, mulch product generated from our recycling area may be added to slopes for erosion control purposes.

### **2.4 Closure Design**

The primary purpose of a landfill cap is to minimize infiltration of water into the waste. The infiltration of rainwater and surface water through the waste results in leachate generation. One of the primary goals of the landfill operator is to reduce the amount of leachate generation.

The typical cap cross section is presented on the Final Closure Plan. As depicted on the cross section, the final closure includes a 24-inch thick cover soil including a 6-inch thick topsoil layer. Specifics regarding the closure and post-closure activities are included in the Closure/Post-Closure Plan, Section 8.0.

## **3.0 WASTE STREAM**

### **3.1 Types of Waste**

The types of waste specified for disposal in the landfill area is anticipated to be consistent with those permitted for disposal in other local C&D landfills. These wastes include wastes resulting from the clearing, construction, remodeling, and repair or demolition operations on pavement, buildings, or

other structures.

### **3.2 Disposal Rates**

The waste generation rate projected for this facility will be on the order of 300 tons/day (5.5 days/week) for a monthly total of 7,150 tons.

Future phases are assumed to have disposal rates similar to those of year 1. Future disposal rates may vary due to population, industrial and commercial growth within the region, recycling efforts, or availability of other landfills or alternative waste disposal methods.

### **3.3 Service Area**

The C&D landfill will service Wake County. The waste stream will consist of waste resulting from the clearing, construction, remodeling, and repair or demolition operations on pavement, buildings or other structures.

### **3.4 Equipment Requirements**

The proposed C&D landfill will be operated with equipment owned by the landfill owner. A dozer or track loader, two CAT 826 compactors, a track-hoe and motor grader will be used for operation of the C&D landfill. A scraper will also be on site for placement of cover soils.

## **4.0 LANDFILL CAPACITY AND BORROW SOIL**

### **4.1 Design Parameters**

Landfill capacity calculations were performed for Phases 1 through 3 from proposed grading and closure plans using anticipated monthly disposal rate data presented previously. The calculations assume a two- percent gross volume for weekly cover and account for a 2-foot thick final cover. The calculations presented in Appendix 1 assume the waste generation rate of 7,150 tons per month.

## **4.2 Operating Capacity**

The gross capacity for the proposed landfill will be on the order approximately 3 million cubic yards. Based on the anticipated waste generation rates at a density of 1000 pounds per cubic yard, the operating capacity for Phases 1 through 3 will be on the order of 15.7 years. Total life span of each phase will be on the order of 5 years.

## **4.3 Borrow Soil Quantities**

Based on the borrow soil quantity calculations presented in Appendix 1, about 270,000 cubic yards of soil will be required for construction, operation and closure of Phases 1 through 3. Borrow soil from excavation within the landfill footprint will provide approximately 600,000 cubic yards of borrow soil. Soil excavated from Phase 1 will be stockpiled on Phase 2. Excess stockpile soils for future phases will be sold to area contractors as fill material. Excess soil may also be utilized for closure operations for the adjacent municipal solid waste landfill.

# **5.0 CONTAINMENT AND ENVIRONMENTAL CONTROL SYSTEMS**

## **5.1 Groundwater Considerations**

The maximum seasonal high groundwater levels and top of bedrock at the project site were used to select the maximum depth/excavation of each phase. As indicated on the Profiles, a minimum four feet separation has been maintained from the landfill subgrade elevation to the estimated seasonal high groundwater level or top of bedrock (whichever is shallower).

## **5.2 Nuisance and Vectors**

Potential nuisances to the areas surrounding the landfill include odor, dust, fires, sedimentation, blowing litter and scavenging. The potential for odors, fires, and blowing litter will be decreased with weekly cover. Small fires (if any) will be extinguished by smothering the fire with soil. Fire fighting equipment from local fire fighting units will be available to extinguish large fires (if any). Blowing litter will also be controlled as necessary with fences and frequent policing. Dust will be minimized by use of road surfaces with aggregate and regular spraying with water. Sedimentation will be controlled with

appropriate erosion and sedimentation control devices. Potential vectors that are not typically a problem with C&D materials include rodents, birds, and other scavengers will be controlled by providing cover material that will limit access of said vectors to waste.

### **5.3 Surface Water and Sedimentation Control**

Surface water will be diverted from the refuse by weekly, intermediate and final cover. The perimeter berms and ditches will divert overland runoff from intercepting the proposed landfill. Weekly and intermediate cover will be used to shed precipitation during development of the landfill. Positive drainage will be maintained on the soil cover surfaces. The surface will be graded to drain toward ditches and berms and routed to the erosion and sediment control structures. Surface water flowing from disturbed areas will be routed into ditches that lead to the sediment basins. The sediment basins will be designed to remove the majority of the sediment from the surface water prior to discharge into Little Branch and Falls Branch.

### **5.4 Wetlands and Floodplain**

A small wetland area is delineated along a drainage feature just north of Falls Branch in the phase III portion of the site. Any landfill development that will impact wetlands are permitted through the appropriate State and Federal agencies. A copy of all wetland permit applications and approvals are included in the Appendix of the Sitting Criteria Report. These permits describe all permitted wetland crossings allowing up to 149 linear feet of impacts.

According to the Federal Emergency Management Agency (FEMA) Flood Insurance Rate Map there is no 100-year floodplain on the landfill property.

## **6.0 C&D LANDFILL OPERATIONS AND MAINTENANCE PLAN**

### **6.1 Hours of Operation**

The C&D landfill and recycling center will be open Monday through Sunday from the hours of 7:00 am to 7:00 pm.

## **6.2 Landfill Development**

The landfill will be developed within the areas shown on the Grading Plan. A 200-foot buffer will be maintained around the entire perimeter. A 500-foot buffer will be maintained from existing residences and water supply wells. A majority of the areas within the buffer will remain wooded with existing trees and vegetation.

The C&D landfill will be constructed so that excavated soil can be used for weekly and final cover. The landfill will be developed in three 5-year phases. The site will be graded in accordance with the Grading Plan which will provide a minimum of four foot separation from waste to the estimated seasonal high groundwater level or top of bedrock (whichever is shallower). Additional borrow soil for the C&D landfill will be available from adjacent phases as needed. The erosion control devices for each phase as shown on the Erosion and Sediment Control Plan will be constructed prior to excavation within each phase.

Waste will be placed initially from the upgradient to the downgradient end of each phase. An initial 10-foot lift of waste will be placed across the landfill phase floor working from upgradient to downgradient areas. After the initial lift has been placed, subsequent lifts will also proceed from the upgradient end toward the downgradient end. This procedure will continue within a permitted phase until proposed final contours are reached. The final cover will consist of a minimum of 2 feet of compacted soil. The final cover will be vegetated with native grasses within six months following closure. Operational phasing diagrams for each phase of development are presented at the end of this section.

## **6.3 Training of Facility Personnel**

Due to the diversity of job tasks required at C&D landfills and the critical nature of the landfill components, personnel are properly trained to handle the operation and maintenance of the facility.

Some of the critical tasks include:

- Maintenance of storm water control devices;
- Accurate records of waste loading (quantitative and qualitative);
- Identification of hazardous and liquid wastes; and
- Control of accidental fires.

The proposed management staff for this facility is properly trained for operation and maintenance of a C&D landfill. The staff includes Mr. Larry Griffin, Sr., owner and operator of three existing C&D landfills located in Huntersville and Harrisburg, North Carolina and Lancaster, South Carolina. Mr. Ron Gilkerson will be Co-Owner and Senior Site Geologist, and Mr. Roger Barnes will be the Operations Manager. Roger Barnes is a SWANA certified landfill manager (certification # 34245). Also, Mr. Steve Blossom will be certified by SWANA in August of 2002. All landfill technicians will have a minimum two years of landfill experience.

#### **6.4 Stormwater Collection and Removal**

Stormwater runoff from the C&D landfill will be directed to the sediment basins. Perimeter ditches located at the boundaries of the C&D area will help divert run-on from entering the area. The ditches and sediment basins will be inspected on a regular basis, and any necessary repairs will be made immediately.

#### **6.5 Waste Placement**

Waste placement will be in lifts of approximately 10 feet in vertical thickness. As mentioned previously, each lift will begin at the upgradient end of each landfill phase and progress towards the downgradient end. As higher elevations are reached, the waste may be placed from downgradient to upgradient on the active face slope as long as landfill surfaces are graded to allow proper drainage. Soil berms will be constructed as necessary to divert run-on from entering the working face or allowing runoff to drain from active areas.

Waste shall be compacted as densely as practical and placed on the smallest active face as feasible. C&D waste shall be covered with a compacted layer of six inches of cover soil at least on a weekly basis or as specified by the Division of Waste Management.

Areas that will not have waste placed for 30 days or more shall be covered with a minimum of one foot of intermediate cover. Areas not filled for 12 months or more shall be seeded with temporary seeding

in accordance with the seeding specifications presented in the Erosion and Sediment Control Plan. The seeding will be provided as necessary to stabilize the cover.

## 6.6 Waste Acceptance

The permit requirements for the C&D landfill will allow the facility to accept the following waste types:

- a. Land-clearing debris as defined in G.S. 130A-290, specifically, solid waste that is generated solely from land-clearing activities, such as stumps, trees, etc.;
- b. Inert Debris defined as solid waste that consists solely of material that is virtually inert, such as brick, concrete, rock and clean soil;
- c. Asphalt in accordance with G.S. 130-294(m); and
- d. Construction and demolition debris defined as solid waste resulting solely from construction, remodeling, repair and demolition operations on pavement, buildings, or other structures.

The Operations Manager shall notify the Division within 24 hours of attempt to dispose of any other waste products. No hazardous, liquid, or infectious waste shall be accepted or disposed of in the C&D landfill.

## 7.0 SITE OPERATIONS AND MAINTENANCE

### 7.1 Entranceway

The entranceway as shown on the Entrance Area Grading Plan is located at the southeast corner of the property. The entrance is accessed by a paved access road that enters the subject property through a 60-foot access easement off Old Smith Field Road. The entrance will have one 15-foot wide entrance lane and one 15-foot wide exit lane.

An island will be placed between the entrance and exit lanes near the scale house to better facilitate landfill traffic. The access road will also provide access to the Recycling Area Convenience Center. The entrance area and island near the scale house will be vegetated with hardy evergreen bushes and seasonal blooming trees. An irrigation system will be installed along the entrance area to provide sufficient watering. The entire length of the access road will be seeded to provide a dense grass cover. This area will be maintained to provide the required Department of Transportation sight distances.

## **7.2 Recycling Center**

A recycling center will be operated for the Town of Apex and Wake County residences. The initial plans are to propose a recycling convenience center drop off area for inert debris, land clearing debris and small amounts of yard waste materials from the Town of Apex. The mulch material will be provided to local residents free of charge. The 1-acre drop off area and 4.2 acre reprocessing area is shown on the Site Grading Plan. The incoming C&D waste volume will also be recycled as much as practicable. Initial estimates anticipate on the order of 20 percent of the incoming waste volume to be recycled. The percent of waste recycled is anticipated to increase each year of operation. The recycling/reprocessing facility will be permitted separately from the landfill. An operations and maintenance plan for the recycling/reprocessing facility will be prepared for the separate permit application.

## **7.3 Access and Security Requirements**

The site will have controlled access with the use of entrance gates. The remainder of the site has wooded buffer zones along the northern property boundary and streams along the western and southern boundaries that prohibit vehicular traffic. A chain-link fence is also proposed along the eastern property boundary. Access roads into the site shall be of all weather construction and maintained in good condition.

A security check station and weigh scales are located at the landfill entrance to evaluate the incoming waste for proper disposal. An attendant will be on duty at the site at all times while the landfill is open for public use to assure compliance with operational requirements. The Operations Manager will be available after normal operating hours.

## **7.4 Erosion/Sedimentation Control Maintenance**

The entire site is designed with erosion and sedimentation control in accordance with the requirements of the Sedimentation Pollution Control Law (15A NCAC 4). The surface water drainage design meets the requirements of the NPDES under Section 402 of the Clean Water Act so that pollutants are not discharged into waters of the State. Erosion/sedimentation control structures include sediment basins and diversion ditches. Sedimentation basins shall be checked after periods of significant runoff.

Sediment shall be removed from the basin to its original dimensions when sediment accumulates to one half of the design depth. The sedimentation basin embankments, spillways and outlets shall also be inspected for erosion damage. All necessary repairs shall be made immediately. Any trash or debris within the sedimentation basin riser shall be removed.

Diversion ditches shall be inspected for damage after each runoff event. Riprap-lined channels and outlet protection used to prevent damage to channel vegetation shall be inspected for wash-outs. Riprap shall be added to these areas as needed.

Embankment and landfill cover slopes shall be periodically inspected for erosion. The slopes shall be mowed no more than twice a year. The embankment slopes shall be re-fertilized in the second year unless vegetation growth is fully adequate. The damaged areas shall be reseeded (permanent seeding for embankment slopes and temporary seeding for landfill cover slopes), fertilized and mulched immediately. Seeding, fertilizing and mulching shall be in accordance with the Erosion and Sediment Control Plan.

## **7.5 Landscaping Maintenance**

Landscaping maintenance will generally include the entranceway closest to the scale house. An irrigation system will provide sufficient watering of the grassed and planted areas. The grass along the entrance will be mowed as needed. Any distressed areas will be reseeded and fertilized as needed to maintain a dense grass cover. Planted bushes and trees will be fertilized and mulched at least twice a year.

## **7.6 Dust, Litter, Odors and Vectors**

Dust generated due to operations will be controlled by the application of water by irrigation or truck. The east access road will be paved from the scale house to Phase I. Removal of mud and dirt from the paved roads will also be a part of the dust control measures. Additionally, final cover and borrow areas will be vegetated as soon as practical in order to reduce the blowing of dust on-site.

The potential problem of blowing litter will be reduced by limiting the size of the active working face and using soil cover over the active fill area. Other methods, such as the utilization of pickers and portable fencing will be employed to contain loose or other wind blown refuse during the landfill operations. The landfill area will be policed as required to collect airborne materials.

Orders are not anticipated to be a problem at this site. However, if odor does occur at the C&D Landfill it will be controlled by the application of soil cover. Vectors are not a typical problem at C&D sites but will also be controlled by the application of soil cover.

### **7.7 Landfill Signs**

Signs providing information on disposal procedures, the hours which the site is open for public use, the permit number, statement that no hazardous or non-permitted waste can be received, and other pertinent information will be posted at the site entrance. Traffic signs and markers will be provided as necessary to promote an orderly traffic pattern to and from the disposal area and maintain efficient operating conditions.

### **7.8 Fire Control**

No open burning of waste will be permitted at the site. Equipment and stockpiled soil shall be provided to control accidental fires. Any fire that occurs at the landfill shall be reported to the Division of Waste Management within 24 hours, and the Operations Manager will submit a written notification within 15 days.

If a fire occurs at the landfill, the local fire department shall be notified. Hot loads that are brought in are to be immediately dumped away from the landfill, and the fire department is to be called. The hot load shall be sprayed down with water until the fire or combustion is extinguished. The load is then to be reloaded for disposal in the landfill.

The local fire department, Apex Fire Department, has been notified of the construction of the C&D Landfill. A letter from the fire department is included in Appendix 2.

## **7.9 Methane Monitoring**

A methane gas-monitoring program will be implemented to detect possible migration of methane gas off-site from the existing landfill and future landfill development. The methane gas-monitoring program is in accordance to the requirements of the North Carolina Solid Waste Management Rules, Section .0503(2)(a). Included in this program is the methane monitoring system, temporary monitoring probe locations and construction, methane-monitoring procedures, sampling frequency and reporting requirements.

### **7.9.1 Temporary Methane Monitoring Probe Location**

The proposed temporary methane gas monitoring probes will be installed to detect methane gas that may migrate into the structures located at the landfill (landfill office) or beyond the landfill property boundary. The temporary probes will be located between the waste boundary and the property boundary and between the waste boundary and facility structures that are occupied or used regularly by landfill personnel. The landfill perimeter gas monitoring probes will be spaced 50 feet outside the waste boundary and at intervals of about 500 feet apart.

### **7.9.2 Temporary Methane Monitoring Probe Construction**

Temporary methane monitoring probes shall be constructed around the perimeter of the landfill by advancing a hand auger to the depth of six feet. A one-inch diameter schedule 40 PVC perforated pipe will be inserted into each boring hole and the annular space backfilled with soil cuttings. The PVC pipe will be installed with a nonventing PVC pipe cap at each location

### **7.9.3 Methane Monitoring Procedures and Frequency**

The landfill personnel trained to use an explosimeter will perform the methane monitoring. Methane monitoring will be conducted in each temporary methane-monitoring probe and within the facility structures occupied by the landfill personnel. Monitoring shall be performed at least 24 hours following monitoring probe installation. Testing procedures for the monitoring probes are to be as follows:

1. Calibrate the explosimeter (if required) in accordance with the manufacturer's recommendations for methane calibration using 1.5% methane test gas in an area free

- from potential methane contamination.
2. Aspirate to purge the explosimeter 4 to 5 times prior to each reading in an area free from potential methane contamination.
  3. Open the cover of the methane monitoring probe.
  4. Insert the explosimeter tube into the probe at a depth of 1-2 feet from the top of casing.
  5. Aspirate 5 to 7 times immediately before gas is evacuated.
  6. Read the percent methane and percent LEL (lower explosive limit).
  7. Record reading.
  8. Remove temporary probe and backfill boreholes (Testing procedures for the facility structures are as follows:)
    - a. Calibrate the explosimeter (if required) in accordance with the manufacturer's recommendations.
    - b. Aspirate to purge the explosimeter (4 to 5 times) prior to each reading in an area free from potential methane contamination.
    - c. For Structures with concrete slab-on-grade: Place explosimeter tube beside any penetrations through walls or floors (i.e., floor drains, electrical outlets and switches, wall mounted lights, cracks in slab, etc.) or around floor board if plumbing and electrical fixtures are not present. Aspirate 5 to 7 times at each location. Purge explosimeter (as above) prior to moving to the next location. For Structures with a crawl space: Conduct testing as described above. In addition, perform testing at the opening for the entrance to the crawl space and any vents or openings for the crawl space. Insert explosimeter 2 to 3 feet into the opening to the crawl space and aspirate 5 to 7 times. Purge explosimeter prior to moving to the next location.
    - d. Read and record percent methane and percent LEL.  
The methane monitoring will be conducted on a minimum quarterly basis.

#### 7.9.4 Reporting Requirements And Response Plan

The results of the measurements of the methane gas monitoring probes will be recorded for each temporary monitoring probe and within each facility structure for each sampling event and placed in the operating record. The State regulations require that explosive gases be controlled such that concentrations of gases will be less than 25 percent of the LEL (lower explosive limit) for methane in site structures and less than the LEL for methane in the subgrade at the facility property boundaries.

If methane gas levels exceeding the maximum LEL (25% LEL in site structures and LEL at facility property boundary) are detected, the landfill personnel shall immediately take all necessary steps to protect human health and notify the Division of Waste Management. The steps that should be taken include but are not limited to:

- Evacuate and restrict access to facility structures or exterior areas with high methane

- levels;
- Prohibit use of equipment and materials that may cause sparks or an open flame;
- Report methane levels to the Operations Manager;
- Turn off electrical main switch outside of the structure where high methane levels are present; and/or
- Operations Manager should direct qualified and properly equipped response teams/contractors to locate the source of methane and cap or isolate it.

Within seven days of detecting levels exceeding the maximum LEL (25% LEL in site structures and LEL at facility property boundary), the methane gas levels shall be placed in the operating record with a description of the steps taken to protect human health. Within 60 days of detecting gas levels exceeding the maximum LEL, a permanent methane monitoring program and remediation plan for the methane gas releases shall be implemented. The plan shall be placed in the operating record, and the Division shall be notified that the plan has been implemented. The Division may grant an extension to the schedules noted above if the owner demonstrates a need for an extension.

## **8.0 CLOSURE/POST-CLOSURE PLAN**

### **8.1 Closure Design**

As required by the North Carolina Solid Waste Management Rules, the landfill will be closed out at the permitted final cover elevations with a minimum two foot-thick final soil cover. The final cover will be compacted as densely as practical to reduce surface water infiltration. The final cover slopes will be graded to 3 horizontal to 1 vertical (3H: 1V) so that a stable final cover can be maintained. Erosion control benches will be provided to break the velocity of the surface water runoff and route the runoff to the sediment basins. The proposed final cover elevations are shown on the Final Closure Plan.

### **8.2 Final Cover Vegetation and Maintenance**

The final cover surface will be seeded, fertilized and mulched to provide a dense stand of grass. The proposed seeding specifications are presented in the Erosion and Sediment Control Plan. The grass cover will be reseeded and fertilized as needed in the second year. The grass cover should not be mowed more than twice a year until dense vegetation is established.

The final cover will be inspected quarterly for signs of settlement, erosion, vector damage, and bare spots. Additional inspections will be performed after large storm events. Depressions in the cover that pond water will be regraded as needed to provide positive drainage. Areas subject to regrading or any bare spots will be reseeded in accordance with the permanent seeding specifications. Any deep-rooted vegetation will be removed so that deep root growth will not compromise the integrity of the final cover.

### **8.3 Post-Closure Property Use**

Once the C&D landfill has been closed-out in accordance with NCDENR guidelines, the entire site would be offered to Wake County for possible use as a park and recreational facility.

### **8.4 Post-Closure Water Quality Monitoring**

Following closure of the landfill, the water quality monitoring will continue in accordance with the State approved water quality-monitoring plan. The Division of Waste Management will determine the monitoring period.

## **CALCULATIONS**

## LANDFILL CAPACITY CALCULATIONS

OBJECTIVE: ESTIMATE CAPACITY OF HWY 55 C&D LANDFILL

### PARAMETERS:

WASTE GENERATION=	300 TONS/DAY
DAYS IN OPERATION PER WEEK=	5.5 DAYS
WASTE UNIT WEIGHT=	1000 LBS/CU. YARD
WEEKLY COVER=	2% OF GROSS VOLUME
FINAL COVER=	2 FT OVER 43 ACRES
GROSS VOLUME=	3,000,000 CU. YARDS (APPROX.) (REF: AUTOCAD 2000 LDD CUT/FILL CALCULATIONS)

### CALCULATIONS:

$$\begin{aligned}\text{WASTE/YEAR} &= (300 \text{ TONS/DAY}) \times (5.5 \text{ DAYS/WEEK}) \\ &\times (52 \text{ WEEKS/YEAR}) \times (1 \text{ CU. YARD}/0.5 \text{ TONS}) = \\ &171,600 \text{ CU. YARDS/YEAR}\end{aligned}$$

$$\begin{aligned}\text{NET VOLUME} &= (3,000,000 \text{ CU. YARDS}) (0.98) - 138746 = \\ &2,828,400 \text{ CU. YARDS}\end{aligned}$$

$$\begin{aligned}\text{LANDFILL LIFE} &= 2,828,400 \text{ CU. YARDS} / 171,600 \text{ CU. YARDS/YEAR} = \\ &16.4 \text{ YEARS}\end{aligned}$$

<sup>3</sup>  
358,000

**3 - 5 YEAR PHASES**

# Borrow Calculations Based on Land Development Desktop Software / ACAD 2000

Site Volume Table: Unadjusted

Cut	Fill	Net	
cu.yds	cu.yds	cu.yds	Method

Stratum: 5-6-02 eg vs sub existing subsurface

688194

74914

613280 (C) Grid

↖ Fill for Berms and Bottom (CY)

Stratum: 5-6-02 sub vs final subsurface fg

3617

2865632

2862014 (F) Grid

↖ Gross Volume (CY)

$$\begin{aligned}\text{Soil Cover} &= 2\% \approx 3,000,000 (0.02) \\ &= 60,000 \text{ CY}\end{aligned}$$

$$\begin{aligned}\text{Final Cover} &= 43 \text{ Acres} (43,560 \text{ ft}^2/\text{ac}) (2 \text{ ft}) (1/27) \\ &= 139,000 \text{ CY}\end{aligned}$$

$$\begin{aligned}\text{Excess Soil} &= 613,280 \text{ CY} \\ &- 66,000 \text{ CY Soil Cover} \\ &- 139,000 \text{ CY Final Cover} \\ \hline &414,280 \text{ CY Excess}\end{aligned}$$

Allow 15% Shrinkage

$$\text{Excess Soil} \approx \boxed{350,000 \text{ CY}}$$

**EROSION & SEDIMENT CONTROL  
DESIGN CALCULATIONS**

**FOR**

**HWY 55 C&D LANDFILL  
WAKE COUNTY, NORTH CAROLINA**

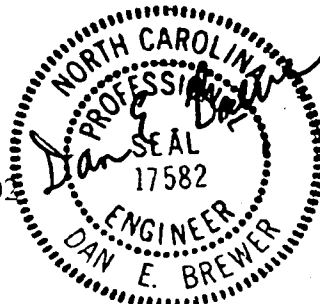
**PREPARED FOR:**

Hwy 55 C&D Landfill, LLC  
Wake County, North Carolina

**PREPARED BY:**

**PATTERSON, BREWER & ASSOCIATES, P.A.**  
ENGINEERING \* SURVEYING \* PLANNING  
P.O. Box 1387, Mooresville, NC 28115  
(704) 662-0100 \* Fax (704) 662-0101

APRIL 2001



PATTERSON, BREWER & ASSOCIATES, P.A.

Job Name Hwy 55 LF Job No. 1401117 Date \_\_\_\_\_ Sheet 1  
 Subject Erosion + Sediment Control By TD Chk By DEB

Sediment Basin Design

SB-1

Drainage Area = 11.4 Ac

C = 0.45 I = 8.19 in/hr

T<sub>c</sub> = 5 min

$$Q_{25} = CIA$$

$$Q_{25} = (0.45 \times 8.19 \times 11.4)$$

$$Q_{25} = 42.0 \text{ cfs}$$

Basin Volume

$$1800 \text{ ft}^3/\text{Ac} (11.4 \text{ Ac}) = 20,520 \text{ ft}^3$$

Min Basin Area for 75% Efficiency

$$(0.01 \text{ Ac/cfs})(42.0 \text{ cfs}) = 18,295 \text{ ft}^2$$

Principal Spillway Design

From table 8.07a where H = 4 ft

Ø CMP Barrel = 30"

From chart 8.07b

Ø Riser = 36"

Height of Riser = 3.5'

$$Q_p = 37.62 \text{ cfs} \quad Q_{25} = 42.0 \text{ cfs}$$

Anti-Flotation Device

$$3.5 \times \frac{\pi 3^2}{4} \times 62.4 \times 1.1 = 169816$$

$$169816 / 150 \text{ lb/ft}^3 = 11.3 \text{ ft}^3$$

Concrete Anti-flotation device

$$4' \times 4' \times 0.75' = 12 \text{ ft}^3$$

Dewatering Holes

$$A_o = \frac{A_s \sqrt{2h}}{Tcd} \quad 20,428$$

$$A_o = \frac{20,520 \sqrt{2(4)}}{3(0.6)(20,428)} = 0.59 \text{ ft}^2 = 85.2 \text{ in}^2$$

PATTERSON, BREWER & ASSOCIATES, P.A.

Job Name Hwy 55 Landfill Job No. M01117 Date \_\_\_\_\_ Sheet 2  
 Subject Erosion - Sediment Control By TPD Chk By DEB

Sediment Basin Design SB-1 (continued)

$$3/4" \text{ hole} = \left( \frac{\pi (0.75^2)}{4} \right) = 0.44 \text{ in}^2$$

$$A_0 = 85.2 \text{ in}^2$$

$$85.2 / 0.44 = 193 \text{ holes}$$

$$\text{Riser circumference} = 113 \text{ in}$$

$$\text{Holes placed every 3 in on center} \\ = 37 \text{ holes/row}$$

$$193 / 37 = 6 \text{ Rows}$$

Outlet Design - Apron

Riprap size from figure 8.06a

$$d_{50} = 6"$$

$$d_{\max} = 6" \times 1.5 = 9"$$

$$"t" (\text{thickness}) = 9" \times 1.5 = 13.5"$$

$$\text{Apron length} = 16'$$

$$\text{Apron width} = D_0 + \text{length} = 2.5' + 16 = 18.5'$$

Emergency Spillway Design

$$Q_e = Q_{25} - Q_p$$

$$Q_e = 42 - 37.62 = 4.38 \text{ cfs}$$

$$\text{From 8.07d: Bottom width} = 16' \\ \text{stage ft} = 0.6'$$

PATTERSON, BREWER & ASSOCIATES, P.A.

Job Name  Hwy 55 C+D Landfill  Job No.  M81117  Date  4/8/02  Sheet  3   
 Subject  Phase I Erosion - Sediment Control Plan  By  TPL  Chk By

Sediment Trap ST1

Min. Volume of Sediment Trap

$$1800 \text{ ft}^3/\text{Acre} \times 2.9 \text{ Acre} = 5220 \text{ ft}^3$$

$$Q_{25} = C i a \quad C = 0.45 \quad I = 8.2 \text{ in/hr}$$

$$Q_{25} = (0.45 \times 8.2 \times 2.9) \quad T_c = 5 \text{ min}$$

$$Q_{25} = 10.7 \text{ cfs}$$

Surface Area for 75% Efficiency

$$10.7 \times 0.01 = 4661 \text{ ft}^2$$

See Table 6.60a For Spillway Design

$$DA \approx 3.0 \text{ Ac} \therefore \text{Weir Length} = 8.0 \text{ ft}$$

$$\text{Top} = 324 \quad \text{Weir elev} = 322.5 \quad \text{Bottom} = 320$$

$$SA @ 322.5 = 5768 \text{ ft}^2$$

Rock Dam RD1

Min Volume for Rock Dam

$$1800 \text{ ft}^3/\text{Acre} \times 5.5 \text{ Acre} = 9900 \text{ ft}^3$$

$$C = 0.45$$

$$I = 8.2 \text{ in/hr}$$

$$T_c = 5 \text{ min}$$

Surface Area Requirement

$$Q_{25} = C i a$$

$$Q_{25} = (0.45 \times 8.2 \times 5.5)$$

$$Q_{25} = 20.3 \text{ cfs}$$

$$0.01 \times 20.3 = 8840 \text{ ft}^2$$

PATTERSON, BREWER & ASSOCIATES, P.A.

Job Name Hwy 55 Landfill Job No. M01117 Date \_\_\_\_\_ Sheet 4  
 Subject Erosion + Sediment Control By TPD Chk By DEB

Sediment Basin Design SB-2

Drainage Area = 6.2 AC C = 0.45 I = 8.19 In/Hr  
 $T_c = 5 \text{ min}$

$$Q_{25} = CIA$$

$$Q_{25} = (0.45 \times 8.19 \times 6.2)$$

$$Q_{25} = 22.9 \text{ cfs}$$

Basin Volume

$$(1800 \text{ ft}^3/\text{AC})(6.2 \text{ AC}) = 11,160 \text{ ft}^3$$

Min Basin Area for 75% Efficiency

$$(0.01 \text{ AC/cfs})(22.9 \text{ cfs}) = 9,975 \text{ ft}^2$$

Principal Spillway Design

From table 8.07a where H = 4 ft

$$\phi \text{ CMP Barrel} = 21''$$

From Figure 8.07b

$$\phi \text{ Riser} = 24''$$

$$\text{Height of Riser} = 3 \text{ ft}$$

$$Q_p = 15.98 \text{ cfs} \quad Q_{25} = 22.9 \text{ cfs}$$

Anti-Flotation Device

$$3' \times \frac{\pi 2^2}{4} \times 62.4 \times 1.1 = 64716$$

$$64716 / 150 \text{ lb/ft}^3 \text{ (concrete)} = 4.3 \text{ ft}^3$$

Concrete anti-flotation device

$$3' \times 3' \times 0.5' = 4.5 \text{ ft}^3$$

Dewatering Holes

$$A_o = \frac{A_s \sqrt{2LW}}{T C_d 20,428}$$

$$A_o = \frac{9975 \sqrt{8}}{(8)(0.6)(20,428)} = 0.28 \text{ ft}^2 = 41.4 \text{ in}^2$$

Job Name Hwy 55 Landfill Job No. M01117 Date \_\_\_\_\_ Sheet 5  
 Subject Erosion & Sediment Control By TPD Chk By \_\_\_\_\_

### Sediment Basin Design SB-2 (continued)

$$\frac{1}{2}'' \text{ hole} = \frac{\pi(0.5)^2}{4} = 0.196 \text{ in}^2$$

$$A_0 = 41.4 \text{ in}^2$$

$$41.4 / 0.196 = 212 \text{ holes}$$

$$\text{Riser Circumference} = 75.4 \text{ in}$$

$$\text{holes placed every 3" on center} = 25 \text{ holes/row}$$

$$212 \text{ holes} / 25 \text{ holes/row} = 9 \text{ rows}$$

### Outlet Design - Apron 2

Riprap size from figure 8.06a

$$d_{50} = 6''$$

$$d_{\max} = 6'' \times 1.5 = 9''$$

$$''t'' (\text{thickness}) = 9'' \times 1.5 = 13.5''$$

$$\text{Apron length} = 9'$$

$$\text{Apron width} = 9' + 1.5' = 10.5'$$

### Emergency Spillway Design

$$Q_e = Q_{25} - Q_p$$

$$Q_e = 22.9 - 15.98 = 6.92$$

$$\text{From 8.07d: Bottom Width} = 8.0 \text{ ft}$$

$$\text{stage feet} = 0.68 \text{ ft}$$

PATTERSON, BREWER & ASSOCIATES, P.A.

Job Name Hwy 55 LF Job No. M0117 Date 3/25/02 Sheet 6  
 Subject EROSION + Sediment Control Plan By TPD Chk By DEL

Drainage Ditch Design PD1

Length = 883 ft Slope = 2.2%

$C = 0.45$

$I = 7.2 \text{ in/hr}$

$$Q_{10} = (0.45 \times 7.2 \times 6.6)$$

$T_L = 5 \text{ min}$

$$Q_{10} = 21.3 \text{ cfs}$$

$DA = 6.6 \text{ Acres}$

Temp Liner Based on 24R Storm Event

$C = 0.45$   $I = 5.6 \text{ IN/HR}$   $T_L = 5 \text{ min}$   $DA = 6.6 \text{ Ac}$

$$Q_2 = C I A$$

$$Q_2 = (0.45 \times 5.6 \times 6.6)$$

$$Q_2 = 16.6 \text{ cfs}$$

PD1  
Worksheet for Trapezoidal Channel

Project Description	
Project File	p:\ddprojects\m01117\dwg\ditches.fm2
Worksheet	Ditch Calculation
Flow Element	Trapezoidal Channel
Method	Manning's Formula
Solve For	Channel Depth

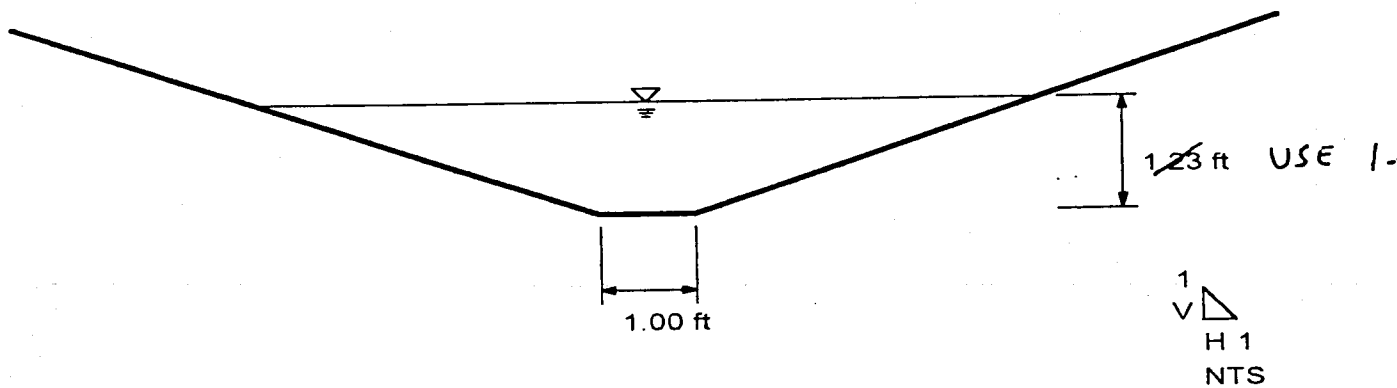
Input Data		
Mannings Coefficient	0.045	
Channel Slope	0.022000	ft/ft
Left Side Slope	3.000000	H : V
Right Side Slope	3.000000	H : V
Bottom Width	1.00	ft
Discharge	21.30	cfs

Results		
Depth	1.23	ft
Flow Area	5.76	ft <sup>2</sup>
Wetted Perimeter	8.77	ft
Top Width	8.37	ft
Critical Depth	1.10	ft
Critical Slope	0.036712	ft/ft
Velocity	3.70	ft/s
Velocity Head	0.21	ft
Specific Energy	1.44	ft
Froude Number	0.79	
Flow is subcritical.		

Cross Section PD1  
Cross Section for Trapezoidal Channel

Project Description	
Project File	p:\ddprojects\m01117\dwg\ditches.fm2
Worksheet	Ditch Calculation
Flow Element	Trapezoidal Channel
Method	Manning's Formula
Solve For	Channel Depth

Section Data	
Mannings Coefficient	0.045
Channel Slope	0.022000 ft/ft
Depth	1.23 ft
Left Side Slope	3.000000 H : V
Right Side Slope	3.000000 H : V
Bottom Width	1.00 ft
Discharge	21.30 cfs



Retardance class D (Tall Fescue - Table 8.05c)

Maximum Permissible Velocity: 4.5 ft./sec. (table 8.05a)

Assume  $n = 0.045$

Flow Area =  $5.66 \text{ ft}^2$ , Wetted Perimeter =  $8.69 \text{ ft}$ , Velocity =  $3.68 \text{ ft/s}$   
 $V_r = 5.76 / 8.77 \times 3.68$

$V_r = 2.43$  Refer to Figure 8.05c  $n = 0.045$

Velocity  $> 2.0 \text{ ft/s}$   $\therefore$  Temp liner is required

10

Straw W/ Net Liner-PD1  
Worksheet for Trapezoidal Channel

Project Description	
Project File	p:\ddprojects\m01117\dwg\ditches.fm2
Worksheet	Temporary Liner- PD1
Flow Element	Trapezoidal Channel
Method	Manning's Formula
Solve For	Channel Depth

Input Data		
Mannings Coefficient	0.033	
Channel Slope	0.022000 ft/ft	
Left Side Slope	3.000000 H : V	
Right Side Slope	3.000000 H : V	
Bottom Width	1.00	ft
Discharge	16.60	cfs

Results		
Depth	0.97	ft
Flow Area	3.79	ft <sup>2</sup>
Wetted Perimeter	7.13	ft
Top Width	6.82	ft
Critical Depth	0.99	ft
Critical Slope	0.020401	ft/ft
Velocity	4.38	ft/s
Velocity Head	0.30	ft
Specific Energy	1.27	ft
Froude Number	1.04	
Flow is supercritical.		

PERMISSIBLE SHEAR STRESS: 1.45 lbs/ft (table 8.05g)

Nvalue=0.033 (table 8.05e)

T=YDS

$$T = (62.4)(0.97)(0.22)$$

$$T = 1.33 \text{ lb/ft}^2$$

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Job Name Hwy 55 LF Job No. M01117 Date 3/04/31 Sheet 12  
Subject Phase 1 Erosion + Sediment Control By TPC Chk By DEB

Perman:  $\pm$  Ditch Drainage PD 2

Drainage Area = 0.5 Acres  $C = 0.45$   $I = 7.2 \text{ in/hr}$   
Length = 340 ft Slope =  $\frac{294 - 283.5}{340}$   $T_c = 5 \text{ min.}$   
 $= 3\%$

$$Q_{10} = C i a$$

$$Q_{10} = (0.45 \times 7.2 \times 0.5)$$

$$Q_{10} = 1.62 \text{ cfs}$$

PD2  
Worksheet for Trapezoidal Channel

Project Description	
Project File	p:\ddprojects\m01117\dwg\ditches.fm2
Worksheet	Ditch Calculation-PD2
Flow Element	Trapezoidal Channel
Method	Manning's Formula
Solve For	Channel Depth

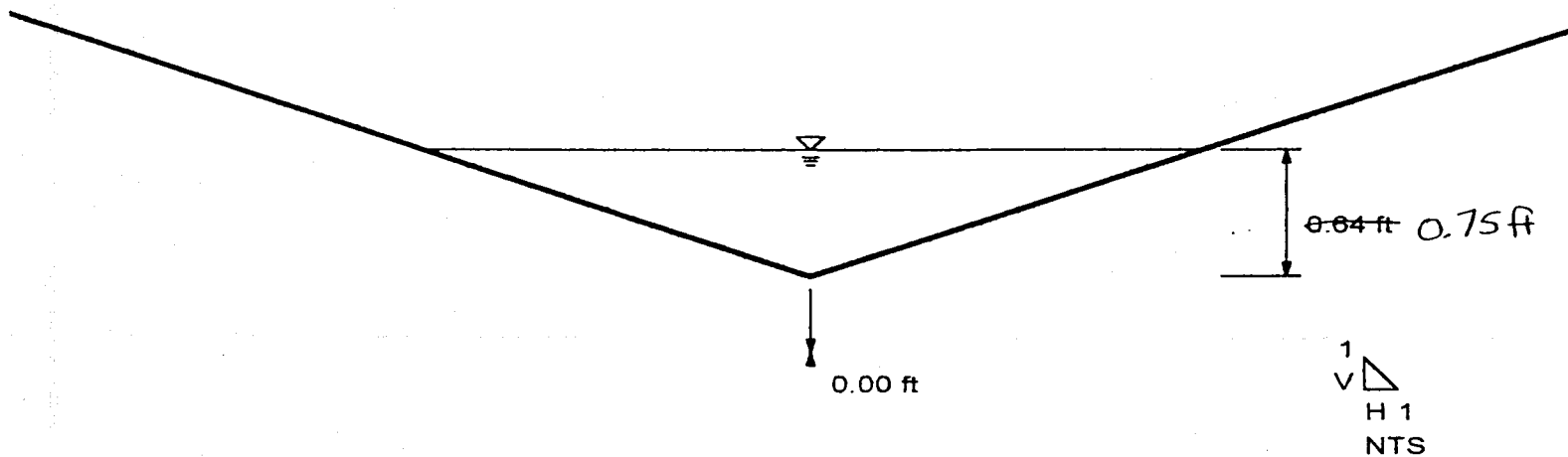
Input Data	
Mannings Coefficient	0.090
Channel Slope	0.030000 ft/ft
Left Side Slope	3.000000 H : V
Right Side Slope	3.000000 H : V
Bottom Width	0.00 ft
Discharge	1.62 cfs

Results	
Depth	0.64 ft
Flow Area	1.25 ft <sup>2</sup>
Wetted Perimeter	4.08 ft
Top Width	3.87 ft
Critical Depth	0.45 ft
Critical Slope	0.208424 ft/ft
Velocity	1.30 ft/s
Velocity Head	0.03 ft
Specific Energy	0.67 ft
Froude Number	0.40
Flow is subcritical.	

Cross Section-PD2  
Cross Section for Trapezoidal Channel

Project Description	
Project File	p:\ddprojects\m01117\dwg\ditches.fm2
Worksheet	Ditch Calculation-PD2
Flow Element	Trapezoidal Channel
Method	Manning's Formula
Solve For	Channel Depth

Section Data	
Mannings Coefficient	0.090
Channel Slope	0.030000 ft/ft
Depth	0.64 ft
Left Side Slope	3.000000 H : V
Right Side Slope	3.000000 H : V
Bottom Width	0.00 ft
Discharge	1.62 cfs



Retardance class D (Tall Fescue - Table 8.05c)

Maximum Permissible Velocity: 4.5 ft./sec. (table 8.05a)

Assume  $n = 0.09$

$$\text{Flow Area} = 1.25 \text{ ft}^2 \text{ Wetted Perimeter} = 4.08 \text{ ft} \text{ Velocity} = 1.3 \text{ ft/s}$$

$$V_r = (1.25 / 4.08) \times 1.3$$

$$V_r = 0.40$$

Refer to figure 8.05c, for  $V_r = 0.4$ ;  $n = 0.09$

Velocity  $< 2.0 \text{ ft/s} \therefore$  Temporary Liner Not Required

PATTERSON, BREWER & ASSOCIATES, P.A.

Job Name Hwy 55 LF Job No. M01117 Date 3/4/02 Sheet 16  
 Subject Phase 1 Erosion + Sediment Control By TPD Chk By DEB

Perminant Ditch Design PD3

Drainage Area = 1.06 acres  $C = 0.45$   $I = 7.2 \text{ in/hr}$   
 Length = 240 ft, Slope =  $\frac{2}{240}$   $T_c = 5 \text{ min.}$   
 0.8%

$$Q_{10} = C i a$$

$$Q_{10} = (0.45 \times 7.2 \times 1.06)$$

$$Q_{10} = 3.4 \text{ cfs}$$

Perminant Ditch Design PD4

Drainage Area = 4.2 acres  $C = 0.45$   $I = 7.2 \text{ in/hr}$   
 Length = 700 ft Slope =  $\frac{329 - 294}{700} = 5\%$   $T_c = 5 \text{ min.}$

$$Q_{10} = C i a$$

$$Q_{10} = (0.45 \times 7.2 \times 4.2)$$

$$Q_{10} = 13.6 \text{ cfs}$$

Temp liner Design Based on 2 YR storm

Drainage Area = 4.2 acres  $C = 0.45$   $I = 5.6$   
 $T_c = 5 \text{ min.}$

$$Q_2 = C i a$$

$$Q_2 = (0.45 \times 5.6 \times 4.2)$$

$$Q_2 = 10.6 \text{ cfs}$$

PD3  
Worksheet for Trapezoidal Channel

Project Description	
Project File	p:\ddprojects\m01117\dwg\ditches.fm2
Worksheet	PD3
Flow Element	Trapezoidal Channel
Method	Manning's Formula
Solve For	Channel Depth

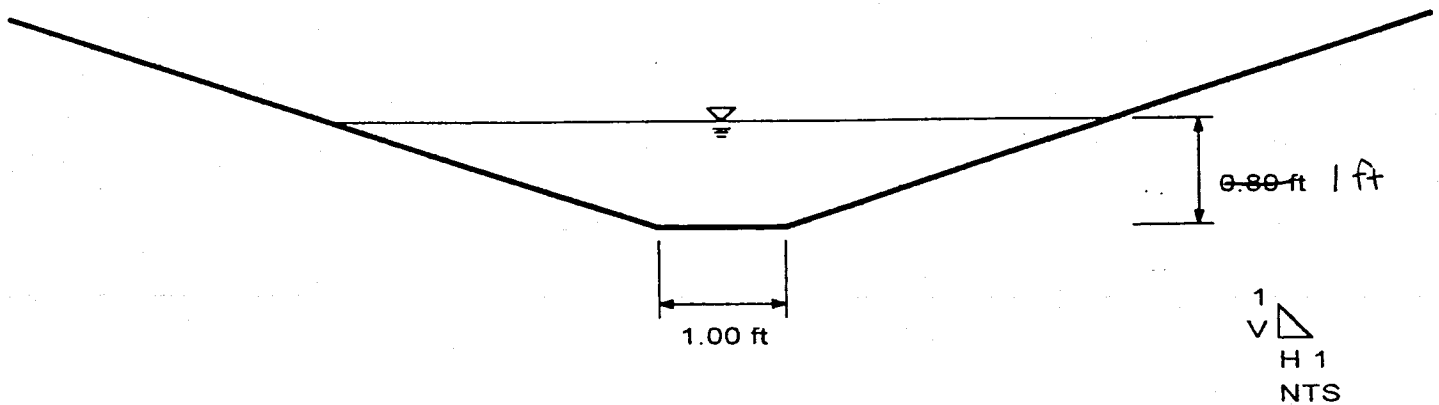
Input Data	
Mannings Coefficient	0.080
Channel Slope	0.008000 ft/ft
Left Side Slope	3.000000 H : V
Right Side Slope	3.000000 H : V
Bottom Width	1.00 ft
Discharge	3.40 cfs

Results	
Depth	0.89 ft
Flow Area	3.28 ft <sup>2</sup>
Wetted Perimeter	6.64 ft
Top Width	6.35 ft
Critical Depth	0.46 ft
Critical Slope	0.147909 ft/ft
Velocity	1.04 ft/s
Velocity Head	0.02 ft
Specific Energy	0.91 ft
Froude Number	0.25
Flow is subcritical.	

Cross Section PD3  
Cross Section for Trapezoidal Channel

Project Description	
Project File	p:\lddprojects\m01117\dwg\ditches.fm2
Worksheet	PD3
Flow Element	Trapezoidal Channel
Method	Manning's Formula
Solve For	Channel Depth

Section Data	
Mannings Coefficient	0.080
Channel Slope	0.008000 ft/ft
Depth	0.89 ft
Left Side Slope	3.000000 H : V
Right Side Slope	3.000000 H : V
Bottom Width	1.00 ft
Discharge	3.40 cfs



Retardance class D (Tall Fescue - Table 8.05c)

Maximum Permissible Velocity: 4.5 ft./sec. (table 8.05a)

Assume  $n = 0.08$

$$\frac{\text{Flow Area} = 3.28 \text{ ft}^2}{V_r = (3.28 / 6.64) \times 1.04} \quad \text{Wetted Perimeter} = 6.64 \text{ ft} \quad \text{Velocity} = 1.04 \text{ ft/s}$$

$$V_r = 0.51$$

Refer to Figure 8.05c  $n = 0.08$

Velocity < 2.0 ft/s  $\therefore$  temp liner not required

PD4  
Worksheet for Trapezoidal Channel

Project Description	
Project File	p:\ltdprojects\m01117\dwg\ditches.fm2
Worksheet	PD4
Flow Element	Trapezoidal Channel
Method	Manning's Formula
Solve For	Channel Depth

Input Data		
Mannings Coefficient	0.045	
Channel Slope	0.050000	ft/ft
Left Side Slope	3.000000	H : V
Right Side Slope	3.000000	H : V
Bottom Width	1.00	ft
Discharge	13.60	cfs

Results		
Depth	0.85	ft
Flow Area	3.03	ft <sup>2</sup>
Wetted Perimeter	6.39	ft
Top Width	6.11	ft
Critical Depth	0.90	ft
Critical Slope	0.038947	ft/ft
Velocity	4.49	ft/s
Velocity Head	0.31	ft
Specific Energy	1.17	ft
Froude Number	1.12	
Flow is supercritical.		

PD4  
Worksheet for Trapezoidal Channel

Project Description	
Project File	p:\ddprojects\m01117\dwg\ditches.fm2
Worksheet	PD4
Flow Element	Trapezoidal Channel
Method	Manning's Formula
Solve For	Channel Depth

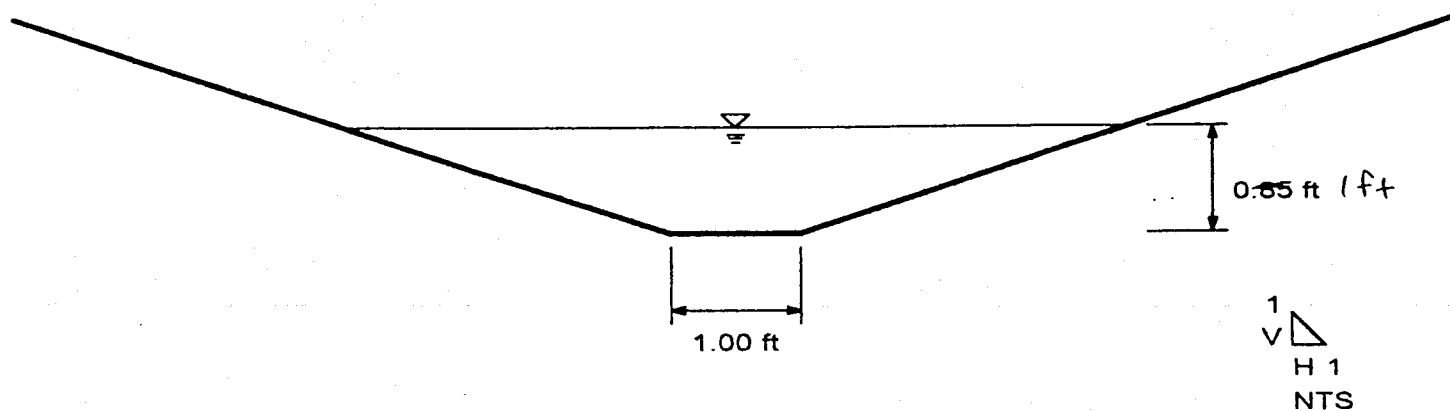
Input Data	
Mannings Coefficient	0.045
Channel Slope	0.050000 ft/ft
Left Side Slope	3.000000 H : V
Right Side Slope	3.000000 H : V
Bottom Width	1.00 ft
Discharge	13.60 cfs

Results	
Depth	0.85 ft
Flow Area	3.03 ft <sup>2</sup>
Wetted Perimeter	6.39 ft
Top Width	6.11 ft
Critical Depth	0.90 ft
Critical Slope	0.038947 ft/ft
Velocity	4.49 ft/s
Velocity Head	0.31 ft
Specific Energy	1.17 ft
Froude Number	1.12
Flow is supercritical.	

Cross Section PD4  
Cross Section for Trapezoidal Channel

Project Description	
Project File	p:\ddprojects\m01117\dwg\ditches.fm2
Worksheet	PD4
Flow Element	Trapezoidal Channel
Method	Manning's Formula
Solve For	Channel Depth

Section Data	
Mannings Coefficient	0.045
Channel Slope	0.050000 ft/ft
Depth	0.85 ft
Left Side Slope	3.000000 H : V
Right Side Slope	3.000000 H : V
Bottom Width	1.00 ft
Discharge	13.60 cfs



Retardance class D (Tall Fescue - Table 8.05c)

Maximum Permissible Velocity: 4.5 ft./sec. (table 8.05a)

Assume  $n = 0.045$

---

flow area =  $3.03 \text{ ft}^2$  Wetted Perimeter = 6.39 Velocity =  $4.49 \text{ ft/s}$   
 $V_r = (3.03/6.39) \times 4.49$

$V_r = 2.12$

Refer to figure 8.05c  $n = 0.045$

Velocity  $> 2.0 \text{ ft/s}$   $\therefore$  Temp lines is required

SYNTHETIC MAT PD4  
Worksheet for Trapezoidal Channel

Project Description	
Project File	p:\ddprojects\m01117\dwg\ditches.fm2
Worksheet	PD4 TEMPORARY LINER
Flow Element	Trapezoidal Channel
Method	Manning's Formula
Solve For	Channel Depth

Input Data	
Mannings Coefficient	0.025
Channel Slope	0.050000 ft/ft
Left Side Slope	3.000000 H : V
Right Side Slope	3.000000 H : V
Bottom Width	1.00 ft
Discharge	10.60 cfs

Results	
Depth	0.59 ft
Flow Area	1.62 ft <sup>2</sup>
Wetted Perimeter	4.72 ft
Top Width	4.53 ft
Critical Depth	0.80 ft
Critical Slope	0.012422 ft/ft
Velocity	6.53 ft/s
Velocity Head	0.66 ft
Specific Energy	1.25 ft
Froude Number	1.92
Flow is supercritical.	

PERMISSIBLE SHEAR STRESS: 2.00 lbs/ft (table 8.05g)

Nvalue=0.025 (table 8.05e)

T=YDS

$T = (62.4)(0.59 \times 0.5)$

T= 1.84 use Synthetic Mat

TD1  
Worksheet for Trapezoidal Channel

Project Description	
Project File	p:\dddprojects\m01117\dwg\ditches.fm2
Worksheet	TD1
Flow Element	Trapezoidal Channel
Method	Manning's Formula
Solve For	Channel Depth

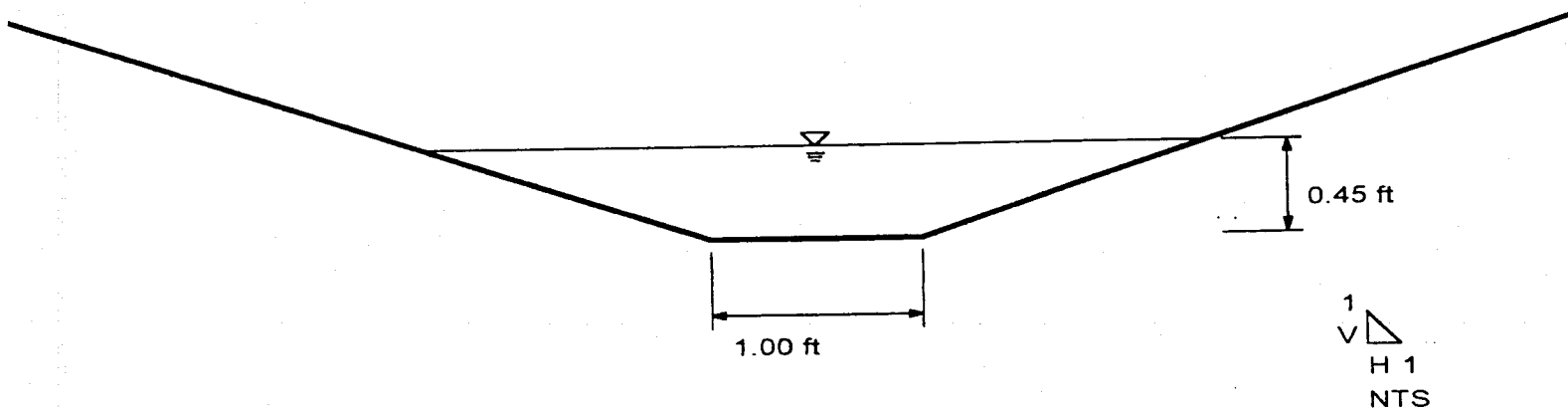
Input Data		
Mannings Coefficient	0.100	
Channel Slope	0.030000	ft/ft
Left Side Slope	3.000000	H : V
Right Side Slope	3.000000	H : V
Bottom Width	1.00	ft
Discharge	1.17	cfs

Results		
Depth	0.45	ft
Flow Area	1.07	ft <sup>2</sup>
Wetted Perimeter	3.87	ft
Top Width	3.72	ft
Critical Depth	0.27	ft
Critical Slope	0.267329	ft/ft
Velocity	1.09	ft/s
Velocity Head	0.02	ft
Specific Energy	0.47	ft
Froude Number	0.36	
Flow is subcritical.		

Cross Section TD1  
Cross Section for Trapezoidal Channel

Project Description	
Project File	p:\ddprojects\m01117\dwg\ditches.fm2
Worksheet	TD1
Flow Element	Trapezoidal Channel
Method	Manning's Formula
Solve For	Channel Depth

Section Data	
Mannings Coefficient	0.100
Channel Slope	0.030000 ft/ft
Depth	0.45 ft
Left Side Slope	3.000000 H : V
Right Side Slope	3.000000 H : V
Bottom Width	1.00 ft
Discharge	1.17 cfs



Retardance class D (Tall Fescue - Table 8.05c)

Maximum Permissible Velocity: ft./sec. (table 8.05a)

Assume  $n = 0.1$

---

$$\text{Flow Area} = 1.07 \quad \text{Wetted Perimeter} = 3.87 \quad \text{Velocity} = 1.09 \text{ ft/s}$$
$$V_r = (1.07/3.87) \times 1.09 = 0.3$$

$V_r = 0.3$  Refer to figure 8.05c  $n \approx 0.1$

Velocity  $< 2.0 \text{ ft/s} \therefore$  NO Temporary Lining Required

TD2  
Worksheet for Trapezoidal Channel

Project Description	
Project File	p:\ddprojects\m01117\dwg\ditches.fm2
Worksheet	TD2
Flow Element	Trapezoidal Channel
Method	Manning's Formula
Solve For	Channel Depth

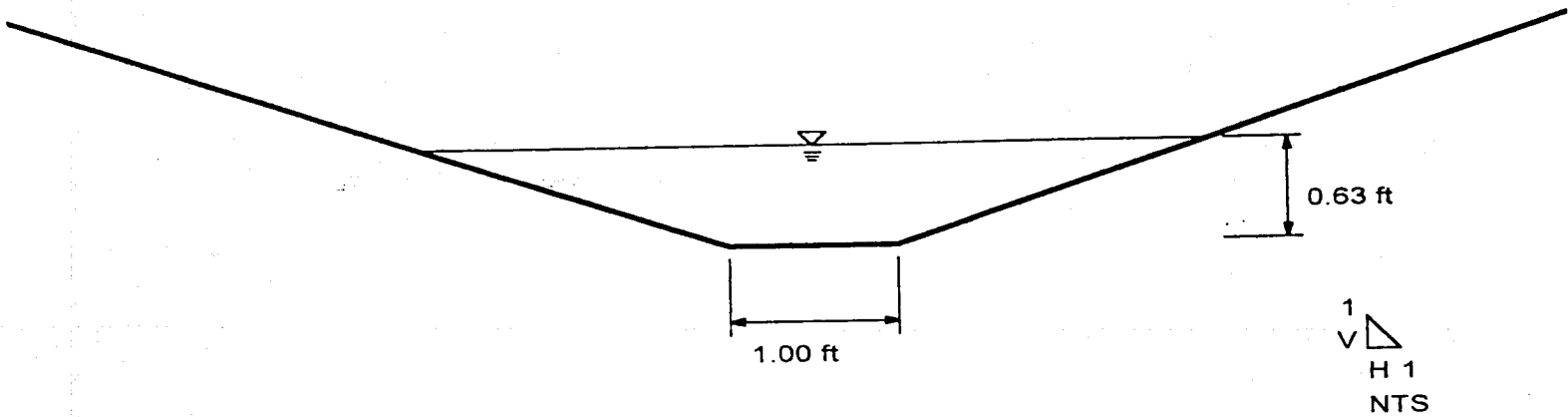
Input Data		
Mannings Coefficient	0.070	
Channel Slope	0.034000	ft/ft
Left Side Slope	3.000000	H : V
Right Side Slope	3.000000	H : V
Bottom Width	1.00	ft
Discharge	3.60	cfs

Results		
Depth	0.63	ft
Flow Area	1.81	ft <sup>2</sup>
Wetted Perimeter	4.96	ft
Top Width	4.76	ft
Critical Depth	0.48	ft
Critical Slope	0.112379	ft/ft
Velocity	1.99	ft/s
Velocity Head	0.06	ft
Specific Energy	0.69	ft
Froude Number	0.57	
Flow is subcritical.		

# Cross Section TD2 Cross Section for Trapezoidal Channel

Project Description	
Project File	p:\ddprojects\m01117\dwg\ditches.fm2
Worksheet	TD2
Flow Element	Trapezoidal Channel
Method	Manning's Formula
Solve For	Channel Depth

Section Data	
Mannings Coefficient	0.070
Channel Slope	0.034000 ft/ft
Depth	0.63 ft
Left Side Slope	3.000000 H : V
Right Side Slope	3.000000 H : V
Bottom Width	1.00 ft
Discharge	3.60 cfs



Retardance class D (Tall Fescue - Table 8.05c)

Maximum Permissible Velocity: ft./sec. (table 8.05a)

Assume  $n = 0.07$

Flow Area = 1.81    Wetted Perimeter = 4.96    Velocity = 1.99 ft/s

$$V_r = (1.81 / 4.96) \times 1.99 = 0.73$$

$V_r = 0.73$     Refer to figure 8.05c     $n \approx 0.07$

velocity < 2.0 ft/s     $\therefore$  Temporary Lining is not Required

TD3  
Worksheet for Trapezoidal Channel

Project Description	
Project File	p:\dddprojects\m01117\dwg\ditches.fm2
Worksheet	TD3
Flow Element	Trapezoidal Channel
Method	Manning's Formula
Solve For	Channel Depth

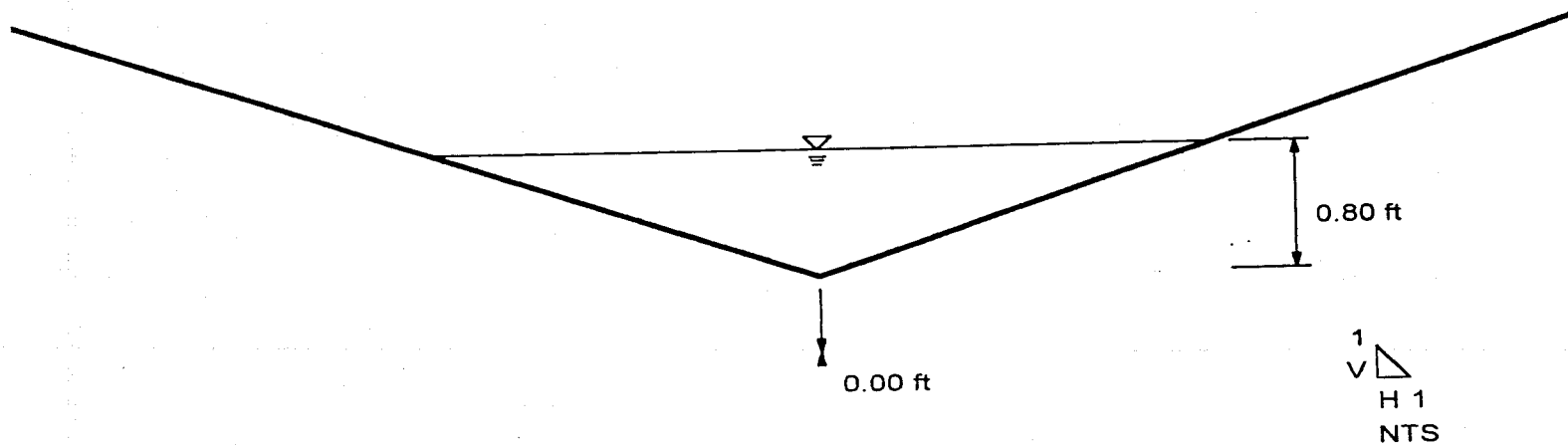
Input Data	
Mannings Coefficient	0.150
Channel Slope	0.008000 ft/ft
Left Side Slope	3.000000 H : V
Right Side Slope	3.000000 H : V
Bottom Width	0.00 ft
Discharge	0.90 cfs

Results	
Depth	0.80 ft
Flow Area	1.93 ft <sup>2</sup>
Wetted Perimeter	5.08 ft
Top Width	4.82 ft
Critical Depth	0.35 ft
Critical Slope	0.626218 ft/ft
Velocity	0.47 ft/s
Velocity Head	0.34e-2 ft
Specific Energy	0.81 ft
Froude Number	0.13
Flow is subcritical.	

Cross Section TD3  
Cross Section for Trapezoidal Channel

Project Description	
Project File	p:\ddprojects\m01117\dwg\ditches.fm2
Worksheet	TD3
Flow Element	Trapezoidal Channel
Method	Manning's Formula
Solve For	Channel Depth

Section Data	
Mannings Coefficient	0.150
Channel Slope	0.008000 ft/ft
Depth	0.80 ft
Left Side Slope	3.000000 H : V
Right Side Slope	3.000000 H : V
Bottom Width	0.00 ft
Discharge	0.90 cfs



Retardance class D (Tall Fescue - Table 8.05c)

Maximum Permissible Velocity: 4.5 ft./sec. (table 8.05a)

Assume  $n = 0.15$

---


$$\text{Flow Area} = 1.93 \text{ ft}^2 \quad \text{Wetted Perimeter} = 5.08 \text{ ft} \quad \text{Velocity} = 0.47 \text{ ft/s}$$

$$V_r = (1.93 / 5.08) \times 0.47$$

$$V_r = 0.17 \quad \text{Refer to figure 8.05c} \quad n \approx 0.15$$

Velocity < 2.0 ft/s  $\therefore$  Temporary Lining not Required

PATTERSON, BREWER & ASSOCIATES, P.A.

Job Name Highway 55 C+D Landfill Job No. MC1117 Date 4/4/02 Sheet 34  
 Subject Phase I Erosion & Sediment Control By TPD Chk By \_\_\_\_\_

Temporary Drainage Ditch Design

TD1 Drainage Area = 0.18 Acres  $C = 0.9$

$$Q_{10} = C I A$$

$$I = 7.2 \text{ in/hr}$$

$$Q_{10} = (0.9 \times 7.2 \times 0.18)$$

$$T_c = 5 \text{ min}$$

$$Q_{10} = 1.17 \text{ cfs}$$

Temporary Drainage Ditch Design

TD2 Drainage Area = 0.56 Acres  $C = 0.9$

$$I = 7.2 \text{ in/hr} \quad T_c = 5 \text{ min}$$

$$Q_{10} = (0.9 \times 7.2 \times 0.56)$$

$$Q_{10} = 3.6 \text{ cfs}$$

Temporary Drainage Ditch Design

TD3 Drainage Area = 0.14 Acres  $C = 0.9$

$$I = 7.2 \text{ in/hr} \quad T_c = 5 \text{ min}$$

$$Q_{10} = C I A$$

$$Q_{10} = (0.9 \times 7.2 \times 0.14)$$

$$Q_{10} = 0.9 \text{ cfs}$$

Temporary Drainage Ditch Design

TD4 Drainage Area = 0.12 Acres  $C = 0.9$   $I = 7.2 \text{ in/hr}$   
 $T_c = 5 \text{ min}$

$$Q_{10} = C I A$$

$$Q_{10} = (0.9 \times 7.2 \times 0.12)$$

$$Q_{10} = 0.78 \text{ cfs}$$

TD4  
Worksheet for Triangular Channel

Project Description	
Project File	p:\ddprojects\m01117\dwg\ditches.fm2
Worksheet	TD4
Flow Element	Triangular Channel
Method	Manning's Formula
Solve For	Channel Depth

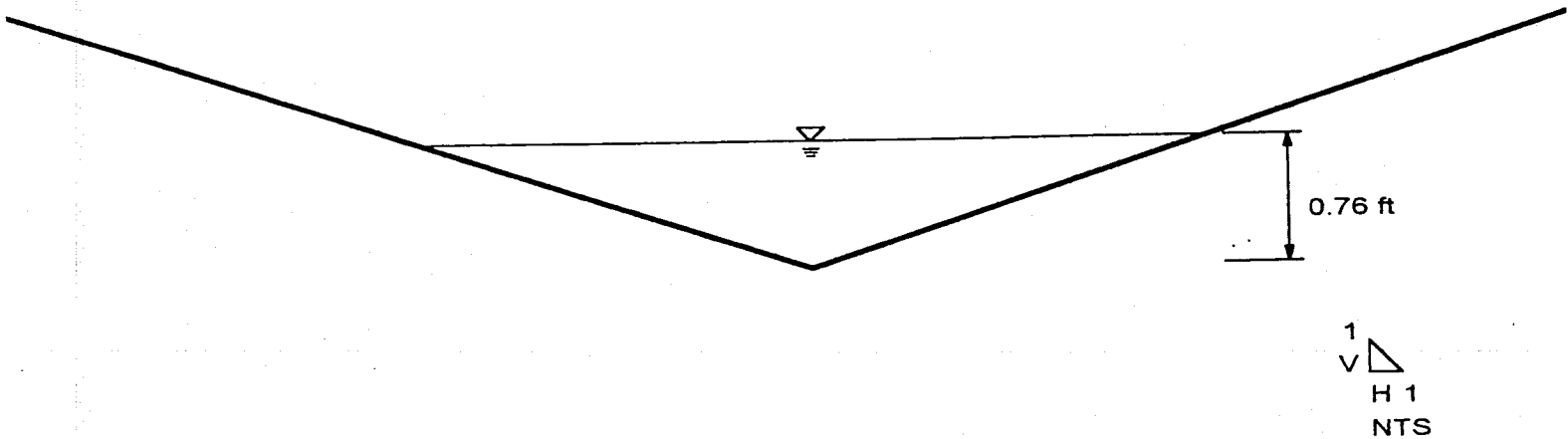
Input Data	
Mannings Coefficient	0.150
Channel Slope	0.008000 ft/ft
Left Side Slope	3.000000 H : V
Right Side Slope	3.000000 H : V
Discharge	0.78 cfs

Results		
Depth	0.76	ft
Flow Area	1.74	ft <sup>2</sup>
Wetted Perimeter	4.81	ft
Top Width	4.57	ft
Critical Depth	0.33	ft
Critical Slope	0.638282	ft/ft
Velocity	0.45	ft/s
Velocity Head	0.31e-2	ft
Specific Energy	0.76	ft
Froude Number	0.13	
Flow is subcritical.		

Cross Section TD4  
Cross Section for Triangular Channel

Project Description	
Project File	p:\ddprojects\m01117\dwg\ditches.fm2
Worksheet	TD4
Flow Element	Triangular Channel
Method	Manning's Formula
Solve For	Channel Depth

Section Data	
Mannings Coefficient	0.150
Channel Slope	0.008000 ft/ft
Depth	0.76 ft
Left Side Slope	3.000000 H : V
Right Side Slope	3.000000 H : V
Discharge	0.78 cfs



Retardance class D (Tall Fescue - Table 8.05c)

Maximum Permissible Velocity: 4.5 ft./sec. (table 8.05a)

Assume  $n = 0.15$

Flow Area = 1.74 ft<sup>2</sup> Wetted Perimeter = 4.81 ft Velocity = 0.45 ft/s

$$V_r = (1.74 / 4.81) \times 0.45 = 0.16$$

$V_r = 0.16$  Refer to figure 8.05c  $n \approx 0.15$

velocity < 2.0 ft/s  $\therefore$  Temporary Lining is not Required

PATTERSON, BREWER & ASSOCIATES, P.A.

Job Name Highway 55 C-D Landfill Job No. MD1117 Date 4/13/02 Sheet 38  
 Subject Phase I Erosion + Sediment Control By TPD Chk By \_\_\_\_\_

Temporary Drainage Ditch Design

TDS Drainage Area = 1.06 Acres  $I = 7.2 \text{ in/hr}$   
 $T_c = 5 \text{ min}$

$$C = \frac{(0.9 \times 0.18) + (0.45 \times 0.88)}{1.06} = 0.52$$

$$Q_{10} = C i a$$

$$Q_{10} = (0.52 \times 7.2 \times 1.06)$$

$$Q_{10} = 4.0 \text{ cfs}$$

Temporary Lining Design TDS

Drainage Area = 1.06  $I = 6.6 \text{ in/hr}$   $T_c = 5 \text{ min}$   
 $C = 0.52$

$$Q_2 = C i a$$

$$Q_2 = (0.52 \times 6.6 \times 1.06)$$

$$Q_2 = 3.6 \text{ cfs}$$

$$n = 0.033$$

Shear Stress - Permissible =  $1.45 \text{ lb/ft}^2$

$$T = VDS$$

$$T = 62.4 \times 0.44 \times 0.036$$

$$T = 0.98 \text{ lb/ft}^2$$

TD5  
Worksheet for Trapezoidal Channel

Project Description	
Project File	p:\ddprojects\m01117\dwg\ditches.fm2
Worksheet	TD5
Flow Element	Trapezoidal Channel
Method	Manning's Formula
Solve For	Channel Depth

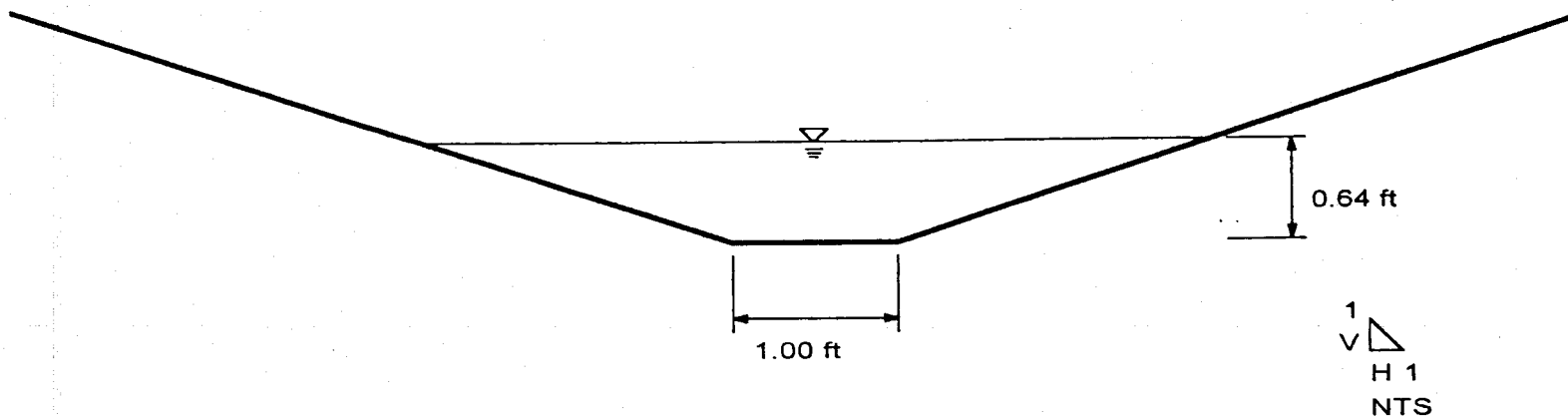
Input Data	
Mannings Coefficient	0.068
Channel Slope	0.036000 ft/ft
Left Side Slope	3.000000 H : V
Right Side Slope	3.000000 H : V
Bottom Width	1.00 ft
Discharge	4.00 cfs

Results	
Depth	0.64 ft
Flow Area	1.87 ft <sup>2</sup>
Wetted Perimeter	5.05 ft
Top Width	4.84 ft
Critical Depth	0.50 ft
Critical Slope	0.104572 ft/ft
Velocity	2.14 ft/s
Velocity Head	0.07 ft
Specific Energy	0.71 ft
Froude Number	0.61
Flow is subcritical.	

Cross Section TD5  
Cross Section for Trapezoidal Channel

Project Description	
Project File	p:\ddprojects\m01117\dwg\ditches.fm2
Worksheet	TD5
Flow Element	Trapezoidal Channel
Method	Manning's Formula
Solve For	Channel Depth

Section Data	
Mannings Coefficient	0.068
Channel Slope	0.036000 ft/ft
Depth	0.64 ft
Left Side Slope	3.000000 H : V
Right Side Slope	3.000000 H : V
Bottom Width	1.00 ft
Discharge	4.00 cfs



Retardance class D (Tall Fescue - Table 8.05c)

Maximum Permissible Velocity: 4.5 ft./sec. (table 8.05a)

Assume  $n = 0.068$

---

$$\text{Flow Area} = 1.87 \text{ ft}^2 \quad \text{Wetted Perimeter} = 5.05 \text{ ft} \quad \text{Velocity} = 2.14 \text{ ft/s}$$
$$V_r = (1.87 / 5.05) \times 2.14$$

$$V_r = 0.79 \quad \text{Refer to Figure 8.05c} \quad n \approx 0.068$$

Velocity  $> 2.14 \text{ ft/s} \therefore$  Temporary Lining is Required

TD5-STRAW W/ NET LINING  
Worksheet for Trapezoidal Channel

Project Description	
Project File	p:\l\ddprojects\m011117\dwg\ditches.fm2
Worksheet	TD5-TEMPORARY LINING
Flow Element	Trapezoidal Channel
Method	Manning's Formula
Solve For	Channel Depth

Input Data		
Mannings Coefficient	0.033	
Channel Slope	0.036000	ft/ft
Left Side Slope	3.000000	H : V
Right Side Slope	3.000000	H : V
Bottom Width	1.00	ft
Discharge	3.60	cfs

Results		
Depth	0.44	ft
Flow Area	1.01	ft <sup>2</sup>
Wetted Perimeter	3.77	ft
Top Width	3.63	ft
Critical Depth	0.48	ft
Critical Slope	0.024978	ft/ft
Velocity	3.56	ft/s
Velocity Head	0.20	ft
Specific Energy	0.63	ft
Froude Number	1.19	
Flow is supercritical.		

TD6  
Worksheet for Trapezoidal Channel

Project Description	
Project File	p:\laddprojects\m01117\dwg\ditches.fm2
Worksheet	TD6
Flow Element	Trapezoidal Channel
Method	Manning's Formula
Solve For	Channel Depth

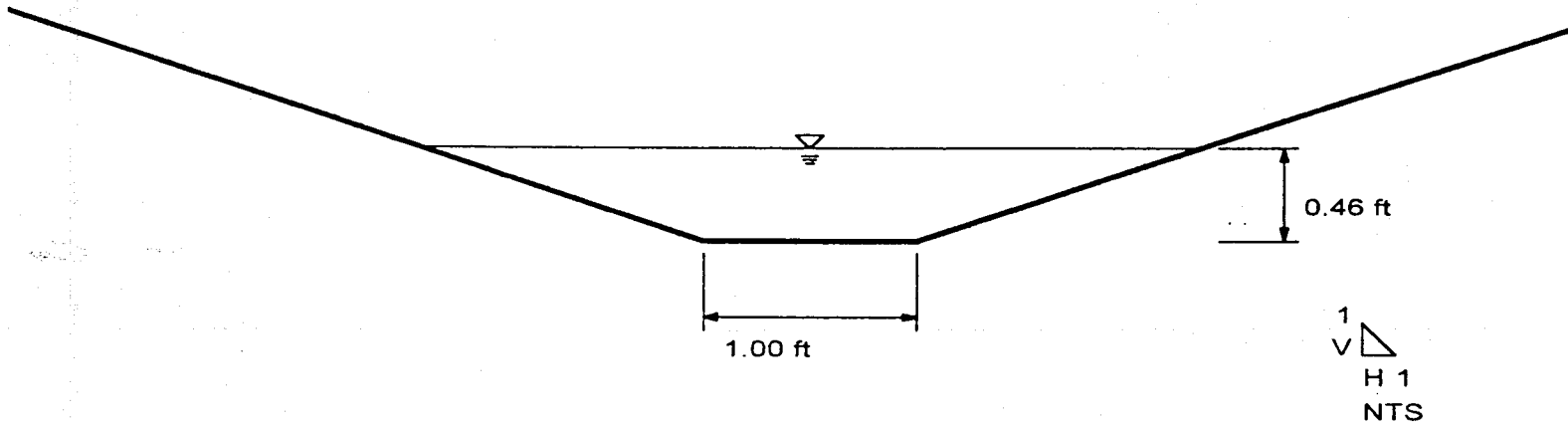
Input Data		
Mannings Coefficient	0.080	
Channel Slope	0.029000	ft/ft
Left Side Slope	3.000000	H : V
Right Side Slope	3.000000	H : V
Bottom Width	1.00	ft
Discharge	1.46	cfs

Results		
Depth	0.46	ft
Flow Area	1.08	ft <sup>2</sup>
Wetted Perimeter	3.89	ft
Top Width	3.74	ft
Critical Depth	0.30	ft
Critical Slope	0.165893	ft/ft
Velocity	1.35	ft/s
Velocity Head	0.03	ft
Specific Energy	0.49	ft
Froude Number	0.44	
Flow is subcritical.		

# Cross Section TD6 Cross Section for Trapezoidal Channel

Project Description	
Project File	p:\ddprojects\m01117\dwg\ditches.fm2
Worksheet	TD6
Flow Element	Trapezoidal Channel
Method	Manning's Formula
Solve For	Channel Depth

Section Data	
Mannings Coefficient	0.080
Channel Slope	0.029000 ft/ft
Depth	0.46 ft
Left Side Slope	3.000000 H : V
Right Side Slope	3.000000 H : V
Bottom Width	1.00 ft
Discharge	1.46 cfs



Retardance class D (Tall Fescue - Table 8.05c)

Maximum Permissible Velocity: 4.5 ft./sec. (table 8.05a)

Assume  $n = 0.08$

---

$$\text{Flow Area} = 1.08 \text{ ft}^2 \quad \text{Wetted Perimeter} = 3.89 \text{ ft} \quad \text{Velocity} = 1.35 \text{ ft/s}$$

$$V_r = (1.08 / 3.89) \times 1.35$$

$$V_r = 0.37 \quad \text{Refer to Figure 8.05c} \quad n \approx 0.08$$

Velocity  $< 2.0 \text{ ft/s} \therefore$  Temporary Lining is not Required.

TD7  
Worksheet for Trapezoidal Channel

Project Description	
Project File	p:\dddprojects\m01117\dwg\ditches.fm2
Worksheet	TD7
Flow Element	Trapezoidal Channel
Method	Manning's Formula
Solve For	Channel Depth

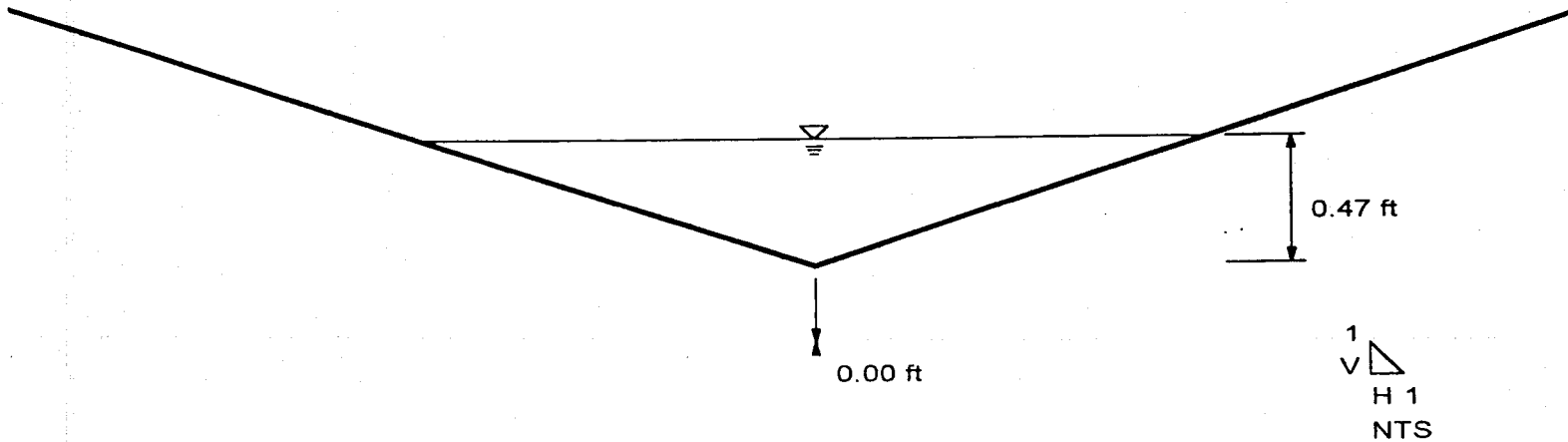
Input Data	
Mannings Coefficient	0.100
Channel Slope	0.036000 ft/ft
Left Side Slope	3.000000 H : V
Right Side Slope	3.000000 H : V
Bottom Width	0.00 ft
Discharge	0.70 cfs

Results	
Depth	0.47 ft
Flow Area	0.67 ft <sup>2</sup>
Wetted Perimeter	2.99 ft
Top Width	2.84 ft
Critical Depth	0.32 ft
Critical Slope	0.287806 ft/ft
Velocity	1.04 ft/s
Velocity Head	0.02 ft
Specific Energy	0.49 ft
Froude Number	0.38
Flow is subcritical.	

Cross Section TD7  
Cross Section for Trapezoidal Channel

Project Description	
Project File	p:\ddprojects\m01117\dwg\ditches.fm2
Worksheet	TD7
Flow Element	Trapezoidal Channel
Method	Manning's Formula
Solve For	Channel Depth

Section Data	
Mannings Coefficient	0.100
Channel Slope	0.036000 ft/ft
Depth	0.47 ft
Left Side Slope	3.000000 H : V
Right Side Slope	3.000000 H : V
Bottom Width	0.00 ft
Discharge	0.70 cfs



Retardance class D (Tall Fescue - Table 8.05c)

Maximum Permissible Velocity: 4.5 ft./sec. (table 8.05a)

Assume  $n = 0.1$

---


$$\text{Flow Area} = 0.67 \text{ ft}^2 \quad \text{Wetted Perimeter} = 2.99 \text{ ft} \quad \text{Velocity} = 1.04$$

$$V_r = (0.67 / 2.99) \times 1.04 = 0.23$$

$V_r = 0.23$  Refer to Figure 8.05c  $n \approx 0.1$

Velocity < 2.0 ft/s  $\therefore$  Temporary Lining is not Required

PATTERSON, BREWER & ASSOCIATES, P.A.

Job Name Hwy 55 C&D LANDFILL Job No. MD1117 Date 4/3/02 Sheet 49  
 Subject Phase 1 Erosion + Sediment Control By TPD Chk By \_\_\_\_\_

Temporary Drainage Ditch Design  
 TD6 Drainage Area = 0.39 Acres  $I = 7.2 \text{ in/hr}$   

$$C = \frac{(0.06 \times 0.9) + (0.33 \times 0.45)}{0.39} = 0.52$$

$$Q_{10} = C i a$$

$$Q_{10} = (0.52 \times 7.2 \times 0.39)$$

$$Q_{10} = 1.46 \text{ cfs}$$

Temporary Drainage Ditch Design  
 TD7 Drainage Area = 0.16 Acres  $I = 7.2 \text{ in/hr}$   

$$C = \frac{(0.05 \times 0.9) + (0.11 \times 0.45)}{0.16}$$

$$T_c = 5 \text{ min.}$$

$$C = 0.59$$

$$Q_{10} = C i a$$

$$Q_{10} = (0.59 \times 7.2 \times 0.16)$$

$$Q_{10} = 0.7 \text{ cfs}$$

Temporary Drainage Ditch Design  
 TD8 Drainage Area = 0.22 Acres  $I = 7.2 \text{ in/hr}$   

$$C = 0.9$$

$$T_c = 5 \text{ min}$$

$$Q_{10} = C i a$$

$$Q_{10} = (0.9 \times 7.2 \times 0.22)$$

$$Q_{10} = 1.4 \text{ cfs}$$

TD8  
Worksheet for Trapezoidal Channel

Project Description	
Project File	p:\dddprojects\m01117\dwg\ditches.fm2
Worksheet	TD8
Flow Element	Trapezoidal Channel
Method	Manning's Formula
Solve For	Channel Depth

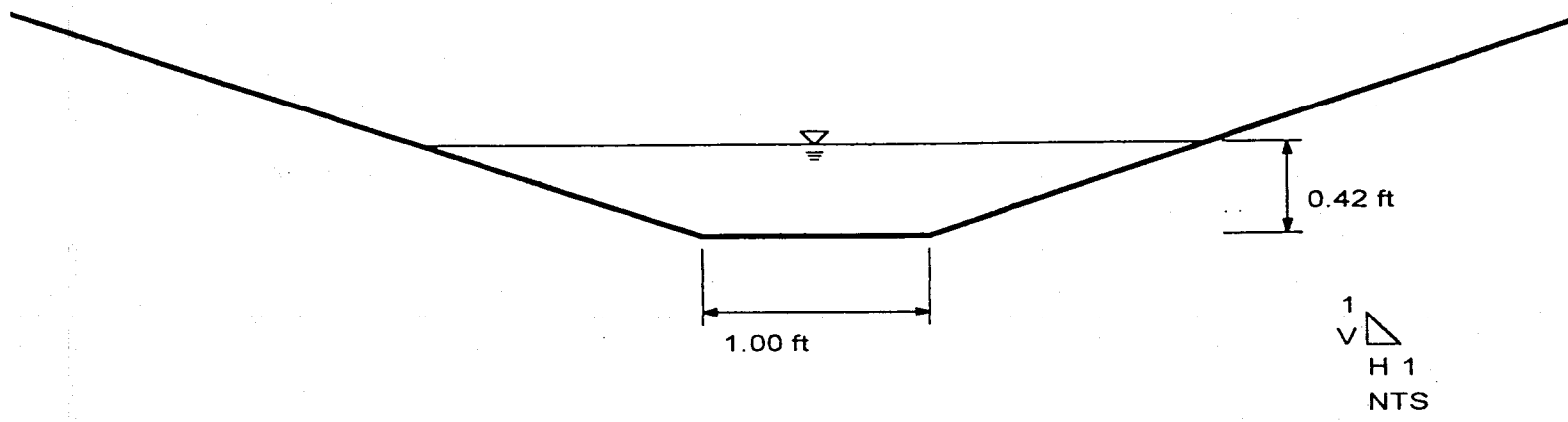
Input Data	
Mannings Coefficient	0.095
Channel Slope	0.056000 ft/ft
Left Side Slope	3.000000 H : V
Right Side Slope	3.000000 H : V
Bottom Width	1.00 ft
Discharge	1.40 cfs

Results	
Depth	0.42 ft
Flow Area	0.93 ft <sup>2</sup>
Wetted Perimeter	3.63 ft
Top Width	3.49 ft
Critical Depth	0.29 ft
Critical Slope	0.235317 ft/ft
Velocity	1.50 ft/s
Velocity Head	0.03 ft
Specific Energy	0.45 ft
Froude Number	0.51
Flow is subcritical.	

Cross Section TD8  
Cross Section for Trapezoidal Channel

Project Description	
Project File	p:\ddprojects\m01117\dwg\ditches.fm2
Worksheet	TD8
Flow Element	Trapezoidal Channel
Method	Manning's Formula
Solve For	Channel Depth

Section Data	
Mannings Coefficient	0.095
Channel Slope	0.056000 ft/ft
Depth	0.42 ft
Left Side Slope	3.000000 H : V
Right Side Slope	3.000000 H : V
Bottom Width	1.00 ft
Discharge	1.40 cfs



Retardance class D (Tall Fescue - Table 8.05c)

Maximum Permissible Velocity: 4.5 ft./sec. (table 8.05a)

Assume  $n = 0.095$

---

$$\text{Flow Area} = 0.93 \text{ ft}^2 \quad \text{Wetted Perimeter} = 3.63 \text{ ft} \quad \text{Velocity} = 1.5 \text{ ft/s}$$
$$V_r = (0.93 / 3.63) \times 1.5 =$$

$V_r = 0.38$  Refer to figure 8.05c  $n \approx 0.095$

Velocity  $< 2.0 \text{ ft/s} \therefore$  Temporary Lining is not Required

PATTERSON, BREWER & ASSOCIATES, P.A.

Job Name Hwy 55 C+D Landfill Job No. MD1117 Date 11/01/02 Sheet 53  
 Subject Phase 1 Sediment + Erosion Control Plan By FL Chk By \_\_\_\_\_

Temporary Drainage Ditch Design TD9

Drainage Area = 1 acre  $C = 0.45$   $I = 7.2 \text{ in/hr}$   
 $T_c = 5 \text{ min}$

$$Q_{10} = C i a$$

$$Q_{10} = (0.45 \times 7.2 \times 1)$$

$$Q_{10} = 3.24 \text{ cfs}$$

Temporary Drainage Ditch Design TD10

Flow for TD10 = (Flow For TD4) + (Flow For TD5)  
 + (Flow For TD3) + (Flow For TD2)

$$Q_{10} \text{ for TD10} = 0.78 + 4.0 + 0.9 + 3.6 = 9.28 \text{ cfs}$$

$$Q_2 \text{ for TD10} = (0.9 \times 6.6 \times 0.56) + (0.9 \times 6.6 \times 0.14) \\
+ (0.9 \times 6.6 \times 0.12) + (0.32 \times 6.6 \times 1.06)$$

$$Q_2 - \text{TD10} = 8.5 \text{ cfs}$$

TD9  
Worksheet for Trapezoidal Channel

Project Description	
Project File	p:\dddprojects\m01117\dwg\ditches.fm2
Worksheet	TD9
Flow Element	Trapezoidal Channel
Method	Manning's Formula
Solve For	Channel Depth

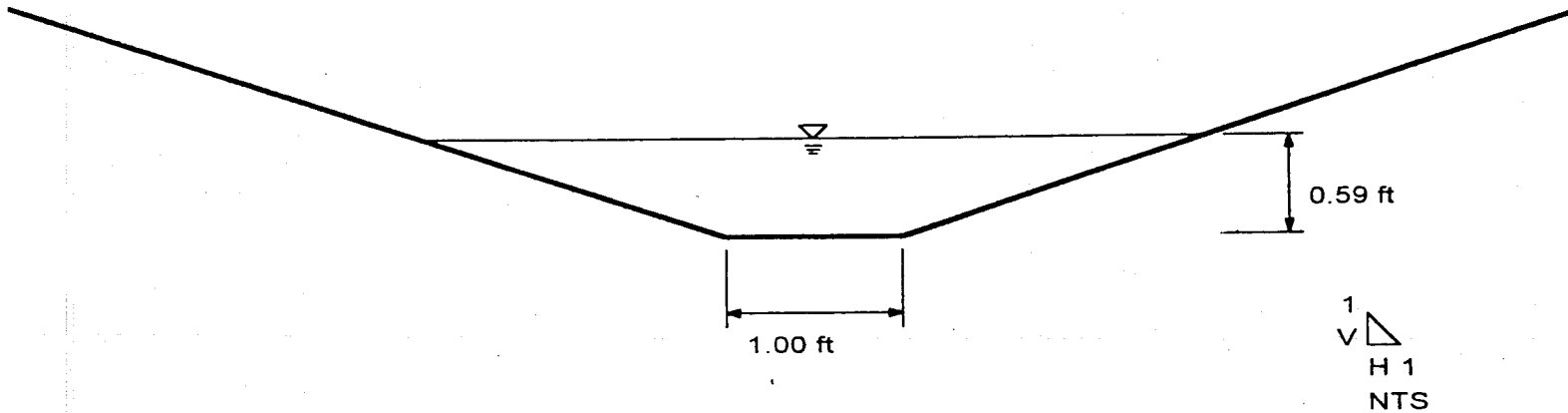
Input Data	
Mannings Coefficient	0.070
Channel Slope	0.036000 ft/ft
Left Side Slope	3.000000 H : V
Right Side Slope	3.000000 H : V
Bottom Width	1.00 ft
Discharge	3.24 cfs

Results	
Depth	0.59 ft
Flow Area	1.63 ft <sup>2</sup>
Wetted Perimeter	4.73 ft
Top Width	4.54 ft
Critical Depth	0.45 ft
Critical Slope	0.113976 ft/ft
Velocity	1.98 ft/s
Velocity Head	0.06 ft
Specific Energy	0.65 ft
Froude Number	0.58
Flow is subcritical.	

Cross Section TD9  
Cross Section for Trapezoidal Channel

Project Description	
Project File	p:\ddprojects\m01117\dwg\ditches.fm2
Worksheet	TD9
Flow Element	Trapezoidal Channel
Method	Manning's Formula
Solve For	Channel Depth

Section Data	
Mannings Coefficient	0.070
Channel Slope	0.036000 ft/ft
Depth	0.59 ft
Left Side Slope	3.000000 H : V
Right Side Slope	3.000000 H : V
Bottom Width	1.00 ft
Discharge	3.24 cfs



Retardance class D (Tall Fescue - Table 8.05c)

Maximum Permissible Velocity: ft./sec. (table 8.05a)

Assume  $n = 0.070$

---


$$\text{Flow Area} = 1.63 \text{ ft}^2 \quad \text{Wetted Perimeter} = 4.73 \text{ ft} \quad \text{Velocity} = 1.98 \text{ ft/s}$$

$$V_r = (1.63/4.73) \times 1.98 =$$

$$V_r = 0.68 \quad \text{Refer to Figure 8.05c} \quad n \approx 0.07$$

Velocity  $< 2.0 \text{ ft/s} \therefore$  Temporary Lining is not Required

TD10  
Worksheet for Trapezoidal Channel

Project Description	
Project File	p:\ddprojects\m01117\dwg\ditches.fm2
Worksheet	TD10
Flow Element	Trapezoidal Channel
Method	Manning's Formula
Solve For	Channel Depth

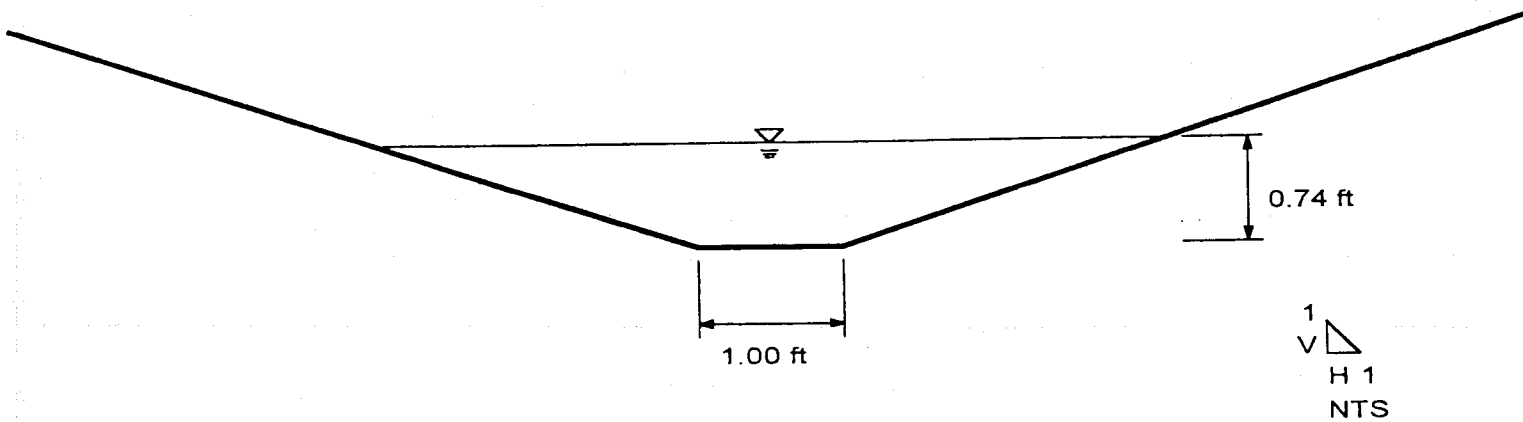
Input Data	
Mannings Coefficient	0.050
Channel Slope	0.054000 ft/ft
Left Side Slope	3.000000 H : V
Right Side Slope	3.000000 H : V
Bottom Width	1.00 ft
Discharge	9.28 cfs

Results	
Depth	0.74 ft
Flow Area	2.39 ft <sup>2</sup>
Wetted Perimeter	5.69 ft
Top Width	5.45 ft
Critical Depth	0.75 ft
Critical Slope	0.050564 ft/ft
Velocity	3.88 ft/s
Velocity Head	0.23 ft
Specific Energy	0.98 ft
Froude Number	1.03
Flow is supercritical.	

Cross Section TD10  
Cross Section for Trapezoidal Channel

Project Description	
Project File	p:\ddprojects\m01117\dwg\ditches.fm2
Worksheet	TD10
Flow Element	Trapezoidal Channel
Method	Manning's Formula
Solve For	Channel Depth

Section Data	
Mannings Coefficient	0.050
Channel Slope	0.054000 ft/ft
Depth	0.74 ft
Left Side Slope	3.000000 H : V
Right Side Slope	3.000000 H : V
Bottom Width	1.00 ft
Discharge	9.28 cfs



Retardance class D (Tall Fescue - Table 8.05c)

Maximum Permissible Velocity: 4.5 ft./sec. (table 8.05a)

Assume  $n = 0.05$

Flow Area =  $2.39 \text{ ft}^2$  Wetted Perimeter =  $5.69 \text{ ft}$  Velocity =  $3.88 \text{ ft/s}$

$$V_r = (2.39 / 5.69) \times 3.88$$

$V_r = 1.6$  Refer to figure 8.05c  $n \approx 0.05$

Velocity  $> 2.0 \text{ ft/s}$   $\therefore$  Temporary Lining is Required

SYNTHETIC MAT TD10  
Worksheet for Trapezoidal Channel

Project Description	
Project File	p:\ddprojects\m01117\dwg\ditches.fm2
Worksheet	TD 10 TEMPORARY LINING
Flow Element	Trapezoidal Channel
Method	Manning's Formula
Solve For	Channel Depth

Input Data	
Mannings Coefficient	0.025
Channel Slope	0.054000 ft/ft
Left Side Slope	3.000000 H : V
Right Side Slope	3.000000 H : V
Bottom Width	1.00 ft
Discharge	8.50 cfs

Results	
Depth	0.52 ft
Flow Area	1.34 ft <sup>2</sup>
Wetted Perimeter	4.30 ft
Top Width	4.13 ft
Critical Depth	0.72 ft
Critical Slope	0.012789 ft/ft
Velocity	6.35 ft/s
Velocity Head	0.63 ft
Specific Energy	1.15 ft
Froude Number	1.96
Flow is supercritical.	

PERMISSIBLE SHEAR STRESS: 2.00 lbs/ft (table 8.05g)

Nvalue=0.025 (table 8.05e)

T=YDS

$$T = (62.4) \times (0.52) \times (0.054)$$

$$T = 1.75 \text{ lb/ft}^2 \quad \text{OK}$$

**PATTERSON, BREWER & ASSOCIATES, P.A.**

Job Name Hwy 55 C+D LF Job No. M0117 Date 5/6/02 Sheet         
Subject Final Cover Stormwater Measures By TPD Chk By DEB

FCL Drainage Area = 3.0 Acres

$Q_{10} = 7.2 \text{ In/hr}$

$T_L = 5 \text{ min}$

Slope = 33%

C = 0.3

$Q_{10} = (0.3 \times 7.2 \times 3.0)$

$Q_{10} = 6.48 \text{ CFS}$

Armor Form<sup>®</sup> Uniform Section Mat (usm)  
 FOR 3" Thickness  
 Permissible Velocity = 13.5 ft/s  
 Velocity = 13.24 ft/s OK

Note: See Attached Flowmaster worksheet and Product Information sheets

FC 5      Drainage Area = 1.4 Acres

$Q_{10} = 7.2 \text{ In/hr}$

$Q_{10} = (0.3 \times 7.2 \times 1.4)$

$T_c = 5 \text{ min}$

$Q_{10} = 3.02 \text{ cfs}$

slope = 33%

$C = 0.3$

Armor Form (B) Uniform Section Mat (USM)  
For 3" Thickness  
Permissible Velocity = 13.5 ft/s  
Velocity = 13.39 ft/s ok

Note: See Attached Flowmaster Worksheet  
and Product Information sheets

PATTERSON, BREWER & ASSOCIATES, P.A.

Job Name Hwy 55 C+D LF Job No. MD1117 Date 5/6/02 Sheet \_\_\_\_\_  
Subject Final Cover Stormwater Measures By TPD Chk By DEB

FC 6 Drainage Area = 2.8 Acres  $Q_{10} = 7.2 \text{ in/hr}$   
 $Q_{10} = (0.3 \times 7.2 \times 2.8)$   $T_c = 5 \text{ min}$   
 $Q_{10} = 6.05 \text{ cfs}$  Slope = 33%  
 $C = 0.3$

Armor Form® Uniform Section Mat (USM)

For 3" Thickness

Permissible Velocity = 13.5 ft/s

Velocity = 13.24 ft/s OK

Note: See Attached Flowmaster Worksheet  
and Product Information sheets

FC 7 Drainage Area = 4.2 Acres  $Q_{10} = 7.2 \text{ in/hr}$   
 $Q_{10} = (0.3 \times 7.2 \times 4.2)$   $T_c = 5 \text{ min}$   
 $Q_{10} = 9.07 \text{ cfs}$  Slope = 33%  
 $C = 0.3$

Armor Form® Uniform Section Mat (USM)  
For 3" Thickness

Permissible Velocity = 13.5 ft/s

Velocity = 13.11 ft/s OK

Note: See Attached Flowmaster Worksheet  
and Product Information sheets

**ARMORFORM (3" USM)**  
**Worksheet for Trapezoidal Channel**

Project Description	
Project File	p:\ddprojects\m01117\dwg\fc ditch.fm2
Worksheet	FC 1
Flow Element	Trapezoidal Channel
Method	Manning's Formula
Solve For	Channel Depth

Input Data	
Mannings Coefficient	0.015
Channel Slope	0.330000 ft/ft
Left Side Slope	5.000000 H : V
Right Side Slope	5.000000 H : V
Bottom Width	3.00 ft
Discharge	6.48 cfs

Results	
Depth	0.13 ft
Flow Area	0.49 ft <sup>2</sup>
Wetted Perimeter	4.36 ft
Top Width	4.33 ft
Critical Depth	0.41 ft
Critical Slope	0.005004 ft/ft
Velocity	13.24 ft/s
Velocity Head	2.72 ft
Specific Energy	2.86 ft
Froude Number	6.95
Flow is supercritical.	

ARMOFORM (3" USM)  
Worksheet for Trapezoidal Channel

Project Description	
Project File	p:\ddprojects\m01117\dwg\fc ditch.fm2
Worksheet	FC 5
Flow Element	Trapezoidal Channel
Method	Manning's Formula
Solve For	Channel Depth

Input Data		
Mannings Coefficient	0.015	
Channel Slope	0.330000	ft/ft
Left Side Slope	3.000000	H : V
Right Side Slope	3.000000	H : V
Bottom Width	1.00	ft
Discharge	3.02	cfs

Results		
Depth	0.15	ft
Flow Area	0.23	ft <sup>2</sup>
Wetted Perimeter	1.98	ft
Top Width	1.93	ft
Critical Depth	0.44	ft
Critical Slope	0.005283	ft/ft
Velocity	13.39	ft/s
Velocity Head	2.79	ft
Specific Energy	2.94	ft
Froude Number	6.90	
Flow is supercritical.		

ARMORFORM (3" USM)  
Worksheet for Trapezoidal Channel

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Project Description

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Project File	p:\ddprojects\m01117\dwg\gcditch.fm2
Worksheet	FC 6
Flow Element	Trapezoidal Channel
Method	Manning's Formula
Solve For	Channel Depth

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Input Data

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Mannings Coefficient	0.015	
Channel Slope	0.330000	ft/ft
Left Side Slope	4.000000	H : V
Right Side Slope	4.000000	H : V
Bottom Width	3.00	ft
Discharge	6.05	cfs

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Results

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Depth	0.13	ft
Flow Area	0.46	ft <sup>2</sup>
Wetted Perimeter	4.07	ft
Top Width	4.04	ft
Critical Depth	0.41	ft
Critical Slope	0.004973	ft/ft
Velocity	13.24	ft/s
Velocity Head	2.72	ft
Specific Energy	2.85	ft
Froude Number	6.94	
Flow is supercritical.		

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**ARMORFORM®**

# UNIFORM SECTION MAT (USM)

## TYPICAL DIMENSIONS, WEIGHTS AND VOLUMES

(Values shown are typical only, and will vary with field conditions.)



Uniform Section Size	Cord Spacing	Nominal Thickness	Weight/ Sq. Ft.	Coverage/ Cu. Yd. Concrete	Availability
3" USM	3" x 3"	3.0"	35 lbs.	97 ft. <sup>2</sup>	Inventory
4" USM	3" x 3"	4.0"	47 lbs.	73 ft. <sup>2</sup>	Inventory
6" USM	3" x 4"	6.0"	70 lbs.	49 ft. <sup>2</sup>	Inventory
8" USM	3" x 5"	8.0"	93 lbs.	36 ft. <sup>2</sup>	Special Order

## PRODUCT DESCRIPTION

**Uniform Section Mat (USM)** is formed with a double-layer woven fabric, joined together by spacer cords and engineered exclusively to serve as a form for casting concrete erosion control linings. The fabric forms are positioned on the area to be protected, where they are filled with a pumpable fine aggregate concrete (structural grout).

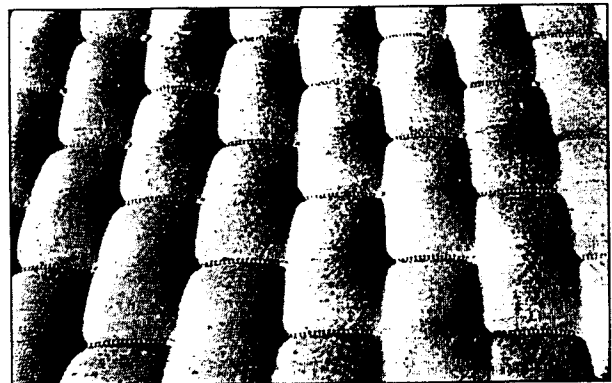
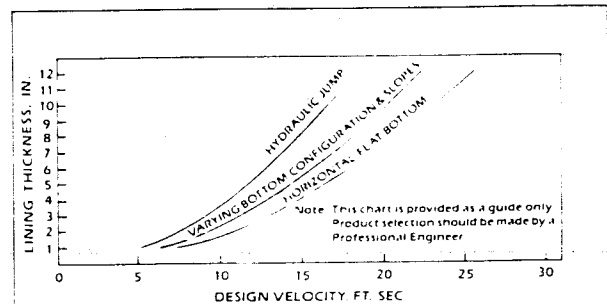
Uniform Section Mat fabric is woven from polypropylene slit film yarns, and designed with the required strength, stability, and filtration characteristics of a superior fabric form. The fabric forms are constructed with spacer cords on closely spaced centers to form a lining of required nominal thickness, bonded cobbled surface, and specified weight to provide strength and erosion protection. The design criterion for selection of lining thickness is the same as that used to determine the thickness of conventional concrete slope paving.

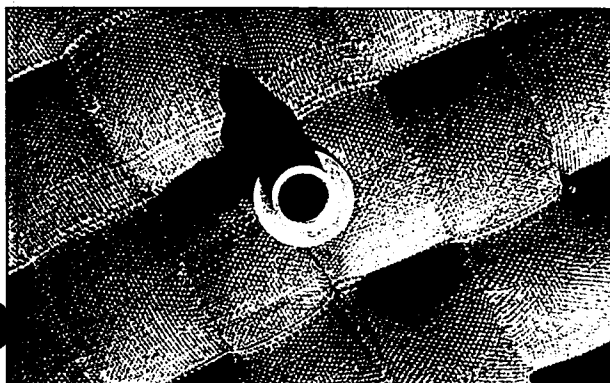
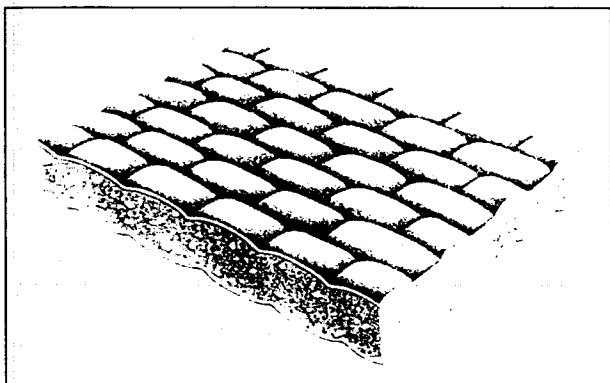
Relief of hydrostatic uplift pressure, caused by entrapped and ground water, may be provided by inserting plastic weep tubes through the mat at specified centers. When weep tubes are used, the lower end of the weep tube should be covered by filter fabric or the mat should be placed over filter fabric.

At Nicolon's fabrication facilities, Uniform Section Mat fabric in mill width rolls is factory fabricated into multiple mill width panels, designed to fit site dimensions and topography.

Panels are delivered to the job site where the installer assembles the panels into a continuous concrete forming system. Fabric forms contract as they are pumped with a structural grout. Allowance must be made for this contraction in estimating the quantity of fabric form required. Nicolon should be contacted to determine the appropriate contraction factors for your site conditions.

## VELOCITY -VS- THICKNESS

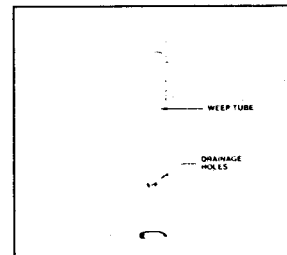
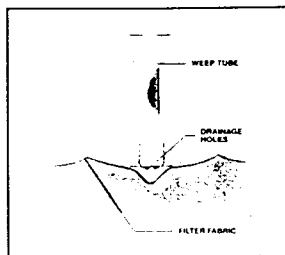




## DESIGN CONSIDERATIONS

- Uniform Section Mat (USM) is used where velocities are low, bedload and ice formations are light, and roughness coefficient,  $n = 0.015$ , is required.
- Uniform Section Mat (USM) is used where wave action and ice formations are light.
- Uniform Section Mat (USM) reduces seepage losses in reservoirs, ponds, holding basins, and channels.
- Uniform Section Mat (USM) is ideal for underwater placement.
- Uniform Section Mat (USM) is recommended for well compacted soil conditions only.

*The information presented herein will not apply to every installation. Dimensions and quantities shown are approximate only and will vary as a result of site conditions and installation procedures. No warranty or guarantee expressed or implied is made regarding the performance of any product, since the manner of use and handling are beyond our control.*



To relieve hydrostatic uplift pressure, specially designed weep tubes may be installed in the fabric forms prior to filling. These are normally placed on 5 to 10 feet centers, either concentrated in groups or distributed.

## FINE AGGREGATE CONCRETE MIX DESIGN

1. A pumpable fine aggregate concrete (structural grout) is used in the construction of all Uniform Section Mat (USM) linings. As an aid to pumpability, a pozzolan grade fly ash may be substituted for up to 35% of the cement. Mixes designed with 5% to 8% air content will have improved pumpability and resistance to freeze-thaw. A retarding admixture may be used in hot weather.
2. Excess mixing water expelled through the permeable ARMORFORM fabric will reduce the volume of fluid structural grout from 27 cu. ft. to approximately 25 cu. ft. of hardened grout.

### Typical Range of Mix Proportions

Material	Mix Proportions lbs./cu. yd.	After Placement lbs./cu. yd.
Cement	750-850	815-920
Sand	2120-2030	2275-2195
Water	540-555	460-470
Air	As Required	

3. Fine aggregate concrete (structural grout) consistency should be in the 9-11 second range when passed through the  $\frac{3}{4}$ " orifice of the standard flow cone described in ASTM C-939-80. Tests utilizing a concrete slump cone are not appropriate.

ARMORFORM® is a NICOLON® product.

U.S. Patent No. 4,502,815 and 4,449,847  
Other U.S. and foreign patents issued and pending

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Telex: 44 10

## 1.0 GENERAL

### 1.1 SCOPE OF WORK

The Contractor shall furnish all labor, materials, equipment, and incidentals required to perform all operations in connection with the installation of the proposed Uniform Section Mat (USM) lining in accordance with the lines, grades, design and dimensions shown on the Contract Drawings and as specified herein.

### 1.2 DESCRIPTION

The work shall consist of installing an unreinforced concrete mat lining, by positioning a specially woven double-layer synthetic fabric form on the surface to be protected and filling it up with a pumpable fine aggregate concrete (structural grout) in such a way as to form a stable mat of required thickness, weight and configuration.

## 2.0 MATERIALS

### 2.1 FINE AGGREGATE CONCRETE

Fine aggregate concrete shall consist of a mixture of portland cement, fine aggregate (sand), and water so proportioned and mixed as to provide a pumpable grout. Pozzolan and grout fluidifier conforming to these Specifications may be used at the option of the Contractor. The mix shall exhibit a compressive strength of 2,000 psi at 28 days when made and tested in accordance with ASTM C-31 and C-39.

*Note: The average compression strength of ARMORFORM cast fine aggregate concrete shall be at least 20% higher at 7 days than that of the companion test cylinders made in accordance with ASTM C-31, and not less than 2,500 psi at 28 days.*

2.1.1 Portland cement shall conform to ASTM C-150, Type I or Type II.

2.1.2 Fine aggregate shall conform to ASTM C-33, except as to grading. Aggregate grading shall be reasonably consistent and shall be well graded from the maximum size which can be conveniently handled with available pumping equipment.

2.1.3 Water for mixing shall be clean and free from injurious amounts of oil, acid, salt, alkali, organic matter or other deleterious substances.

2.1.4 Pozzolan, if used, shall conform to ASTM C-350.

### 2.2 FABRIC FORM

The fabric forms shall be, as specified, ARMORFORM *note a* Uniform Section Mat as manufactured by Nicolon Corporation, or approved equal. Each layer of fabric shall meet the statistical mean (average) results as shown below.

Property	Test Method	Unit	Values USM
Physical:			
Composition			PP <sup>1</sup>
Weight (double-layer)	ASTM D-3776-79	oz/lyd	10
Thickness	ASTM D-1777-75	mil	20
Mill Width		in	84/172

Property	Test Method	Unit	Values USM
Mechanical:			
Grab Tensile Strength	ASTM D-1682-75	lbs	
Warp			200
Fill			200
Grab Tensile Elongation	ASTM D-1682-75	%	
Warp			20
Fill			20
Diaphragm Burst Strength	ASTM D-3786-80 a	psi	475
Trapezoid Tear Strength	ASTM D-1117-80	lbs	
Warp			65
Fill			75
Puncture Strength	ASTM D-3787-80	lbs	60
Hydraulic:			
Water Flow Rate	ASTM D-4491	gal/min/ft	80
Coefficient of Permeability (k)	ASTM D-4491	cm/sec	0.05
Permittivity (k/l)	ASTM D-4491	1/sec	1.0
Porosity	ASTM D-737-75	cf/min/ft	125
Spacer Cord:			
Break Strength	ASTM D-2256	lbs/cord	135 (2)

<sup>1</sup> PP - Polypropylene

The Contractor shall furnish the Engineer, in duplicate, manufacturer's certified test results showing actual test values obtained when the above physical properties were tested for compliance with the Specifications.

*Note a: The Engineer shall indicate the Uniform Section Mat size required. Example: 4" USM.*

2.2.1 Fabric form material shall consist of double-layer woven fabric joined together by spacer cords, of uniform length, to produce a mat with a finished nominal thickness of *note b* inches, and a nominal weight of *note b* lbs./ft.<sup>2</sup>. Spacer cords shall connect two layers of fabric on *note c* centers. Points of connection shall be staggered to provide a bonded cobbled surface appearance.

*Note b: The Engineer shall indicate the nominal mat thickness and weight/sq. ft. for the Uniform Section Mat required.*

*Note c: The Engineer shall indicate the cord spacing for the Uniform Section Mat required.*

2.2.2 Individual mill width rolls of fabric form shall be a minimum width of 84 inches. Mill width rolls shall be cut to the length required, and the two layers of fabric separately joined bottom edge to bottom edge, and top edge to top edge by means of sewing thread, to form multiple mill width panels. All factory sewn seams shall be downward facing as shown on the Contract Drawing. The grab tensile strength of all sewn seams shall be not less than 100 lbs./in. when tested in accordance with ASTM D-1692-75.

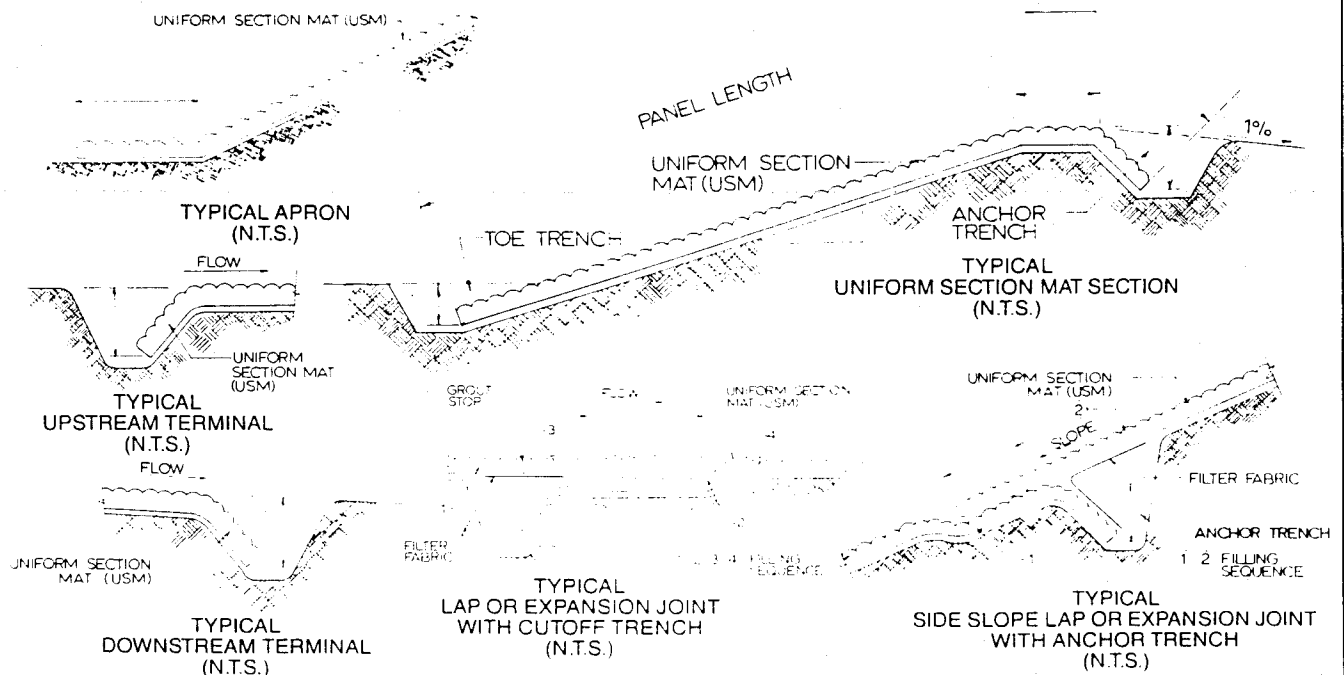
2.2.3 Grout stops shall be installed at predetermined, mill width, intervals to regulate the flow of fine aggregate concrete.

2.2.4 Plastic weep tubes, for relief of hydrostatic uplift pressure, shall be inserted through the mat, at *note d* foot centers, at locations shown on the Contract Drawings. Where weep tubes are required, the

*Note d: Plastic weep tubes are normally inserted in Uniform Section Fabric on approximately 5' to 10' centers, or as specified by the Engineer.*

- seams shall be downward facing as shown on the Contract Drawings except with the approval of the Engineer.

- 3.2.3 When conventional joining of panels is impractical, or where called for on Contract Drawings, adjacent panels may be overlapped a minimum of two feet pending approval by the Engineer. In no case shall simple butt joints between panels be permitted.
- 3.2.4 Lap joints and expansion joints shall be provided as shown on the Contract Drawing, or as specified by the Engineer. Filter fabric with a minimum width of six feet shall be placed under all lap joints and expansion joints and shall extend continuously along the length of the joint.
- 3.2.5 Immediately prior to injection of fine aggregate concrete, the assembled fabric form panels shall be inspected by the Engineer and no fine aggregate concrete shall be pumped therein until the fabric seams and panel connections have been approved.
- 3.3 FINE AGGREGATE CONCRETE PLACEMENT
- 3.3.1 Following panel placement, small slits shall be cut in the top layer of the fabric form to allow for the insertion of the injection pipe. Fine aggregate concrete shall be injected between the top and bottom layers of fabric, filling the panel to the recommended thickness and configuration.
- 3.3.2 Fine aggregate concrete shall be injected in such a way that excessive pressure on the fabric form and cold joints are avoided.
- 3.3.3 Holes in the fabric left by the removal of the injection pipe shall be temporarily closed by inserting a piece of burlap or similar material. The burlap shall be removed when the concrete is no longer fluid and the concrete surface at the hole smoothed by hand. Foot traffic on the filled mat shall be restricted to an absolute minimum for one hour after pumping.
- 3.3.4 Upon completion of the fine aggregate concrete placement, all the anchor trenches, terminal trenches and toe trenches shall be backfilled and compacted, as specified by the Engineer.



*Town of Apex*P. O. BOX 250  
APEX, NORTH CAROLINA 27502

April 30, 2002

Ronald C. Gilkerson  
Hwy 55 Landfill and Recycling Center  
19109 West Catawba Ave.; Suite 118  
Cornelius, NC 28031-5613

Dear Mr. Gilkerson:

I am writing this letter to confirm that the Apex Fire Department is aware of your project and will respond to any fire safety needs. The Fire Department has received a site plan and has knowledge of all products and their locations that will be on site. Based on the information provided, we understand the following about the project:

- The project is located on Old Smithfield Road off Highway 55 Bypass, Wake County, NC.
- The facility will be reprocessing land-clearing debris, grass clippings, loose leaves, soil components, aggregate material, and tree limbs.
- These materials will be reprocessed in windrows that will be 8-12 feet high. Windrows that are 12 feet high will require a width of 20 feet, and each winrow will be place no closer than 25 feet apart which will provide adequate fire breaks.

If you required additional information from the Town of Apex, please contact me at 919-362-4001 or Dan LaMontagne at 919-362-8166.

Sincerely,

Alan Capps  
Interim Chief

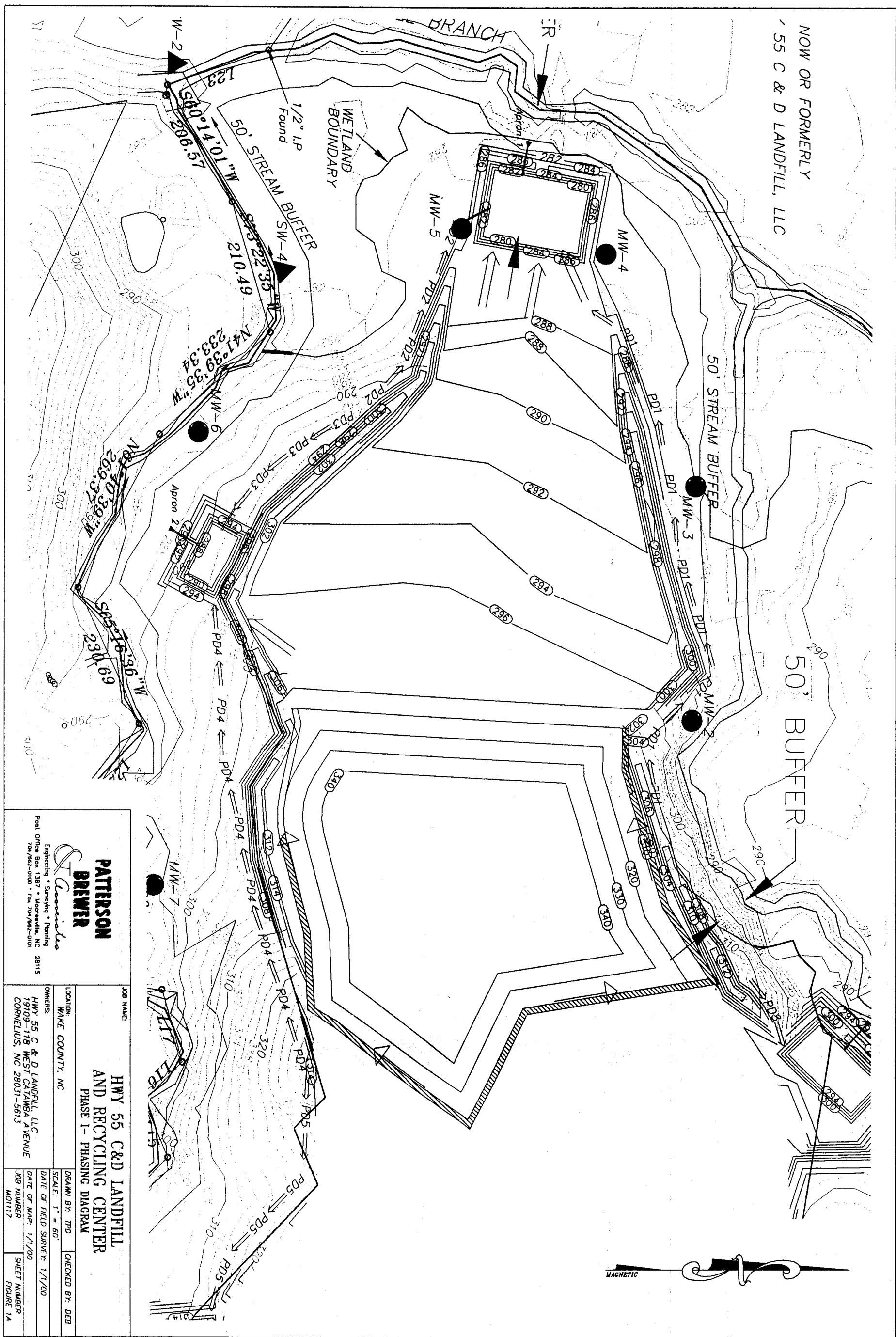
Cc: Dan LaMontagne, PE – Apex Public Works



Multiple  
Drawings at  
End of File  
Also

NOW OR FORMERLY  
55 C & D LANDFILL, LLC

50' BUFFER



**PATTERSON  
BREWER**

Engineering • Surveying • Planning  
Post Office Box 1387 • Mooreville, NC 28115  
704/662-0100 • Fax 704/662-0101

HWY 55 C&D LANDFILL  
AND RECYCLING CENTER  
PHASE 1 - PHASING DIAGRAM

JOB NAME:	LOCATION:	DRAWN BY:	CHECKED BY:
HWY 55 C&D LANDFILL, LLC	WAKE COUNTY, NC	TPD	DEB
OWNERS:	SCALE:	DATE OF FIELD SURVEY:	DATE OF MAP:
HWY 55 C & D LANDFILL, LLC	1" = 60'	1/1/00	1/1/00
19109-118 WEST CATAWBA AVENUE			
CORNELIUS, NC 28031-5613			
JOB NUMBER			SHEET NUMBER
M01117			FIGURE 1A

NOW OR FORMERLY  
HWY 55 C & D LANDFILL, LLC

50' BUFFER

UFFER

LITTLE BRANCH

WETLAND  
BOUNDARY

SW-2

1/2" LP  
Found

50' STREAM BUFFER

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NOW OR FORMERLY  
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50' BUFFER

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LITTLE BRANCH

WETLAND  
BOUNDARY

4+23.57" W  
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1/2" I.P.  
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50' STREAM BUFFER

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## EXHIBIT "A"

BEGINNING at a point located in Falls Branch, said point being located North 70 degrees 30 minutes 09 seconds West 2709.93 feet from a mag nail located in the centerline of S. R. 1172 (a/k/a Old Smithfield Rd.) and the centerline of Highway 55, said point also being the POINT AND PLACE OF BEGINNING, thence along the run of Falls Branch Creek the following calls and distances: South 70 degrees 17 minutes 40 seconds West 82.58 feet to a point, thence North 42 degrees 11 minutes 55 seconds West 197.13 feet to a point, thence South 70 degrees 16 minutes 53 seconds West 125.20 feet to a point, thence South 01 degrees 50 minutes 53 seconds West 120.77 feet to a point, thence South 70 degrees 44 minutes 34 seconds West 156.46 feet to a point, thence North 75 degrees 48 minutes 30 seconds West 99.08 feet to a point, thence South 66 degrees 50 minutes 57 seconds West 127.19 feet to a point, thence South 46 degrees 59 minutes 42 seconds West 104.40 feet to a point, thence South 29 degrees 30 minutes 11 seconds West 155.68 feet to a point, thence South 53 degrees 28 minutes 52 seconds West 162.59 feet to a point, thence South 88 degrees 57 minutes 47 seconds West 156.63 feet to a point, thence South 09 degrees 55 minutes 53 seconds West 72.11 feet to a point, thence South 82 degrees 32 minutes 55 seconds West 246.55 feet, thence South 25 degrees 00 minutes 16 seconds West 112.16 feet to a point, thence North 58 degrees 34 minutes 44 seconds West 89.83 feet to a point, thence South 77 degrees 55 minutes 10 seconds West 104.07 feet to a point, thence North 55 degrees 08 minutes 41 seconds West 128.16 feet to a point, thence North 46 degrees 20 minutes 01 seconds West 160.15 feet to a point, thence South 66 degrees 30 minutes 35 seconds West 95.59 feet to a point, thence North 45 degrees 46 minutes 13 seconds West 87.66 feet to a point, thence South 73 degrees 24 minutes 16 seconds West 114.69 feet to a point, thence South 11 degrees 10 minutes 12 seconds East 87.05 feet to a point, thence North 62 degrees 13 minutes 03 seconds West 106.40 feet to a point, thence South 83 degrees 26 minutes 30 seconds West 152.16 feet to a point, thence South 32 degrees 29 minutes 39 seconds West 85.70 feet to a point, thence North 56 degrees 55 minutes 23 seconds West 163.19 feet to a point, thence South 65 degrees 16 minutes 36 seconds West 230.69 feet to a point, thence North 61 degrees 40 minutes 39 seconds West 269.37 feet to a point, thence North 41 degrees 39 minutes 35 seconds West 233.34 feet to a point, thence South 73 degrees 22 minutes 35 seconds West 210.49 feet to a point, thence South 60 degrees 14 minutes 01 seconds West 206.57 feet to a point, said point being the final point located in the run of Falls Branch Creek, thence North 19 degrees 08 minutes 52 seconds West 169.59 feet to an iron pipe, thence North 54 degrees 25 minutes 57 seconds West 325.79 feet to an iron pipe, thence North 69 degrees 25 minutes 11 seconds West 183.82 feet to an iron pipe, thence North 73 degrees 57 minutes 20 seconds West 219.38 feet to an iron pipe, thence North 77 degrees 55 minutes 48 seconds West 217.53 feet to an iron pipe, thence North 05 degrees 34 minutes 39 seconds West 998.63 feet to a point, thence South 80 degrees 04 minutes 02 seconds East 106.02 feet to a point, thence South 82 degrees 38 minutes 07 seconds East 1467.38 feet to a point, thence South 88 degrees 20 minutes 16 seconds East 672.04 feet to a point, thence South 80 degrees 54 minutes 58 seconds East 580.68 feet to a point, thence North 88 degrees 37 minutes 31 seconds East 704.64 feet to a point, thence South 80 degrees 29 minutes 29 seconds East 647.01 feet to a point, thence South 53

degrees 46 minutes 40 seconds East 472.48 feet to a point, thence South 03 degrees 27 minutes 32 seconds West 400.96 feet to the POINT AND PLACE OF BEGINNING, containing 116.333 acres and being designated as Tract "C" on an unrecorded survey entitled "Property Survey for Highway 55 C & D Landfill, LLC", dated 9/22/01 and prepared by Patterson, Brewer & Associates.

This tract is a portion of the same tract of land referred to as Tract 3 in Deed Book 3850, Page 359, Wake County Registry.

92-30

SCANNED  
3/13/14

Permit File

CF  
92-30  
WAKE  
Hwy 55 GOLF.  
PERMIT FILE.

- (4) The petitioner must obtain construction plan approval from the Inspections Development Plans/Permit Division prior to the issuance of a building permit;
- (5) The petitioner must provide a letter from the Town of Zebulon for water serving the site;
- (6) The petitioner must obtain approval of storm water management devices from Environmental Services; and
- (7) The petitioner must record the notarized form pertaining to the Order of the Board in the Wake County Register of Deeds and return a copy to the Planning Department. The public hearing placard must be returned to the Planning Department prior to receiving the recording form.

Mr. Odom made a motion that in the matter of BA SU-1920-01, that the Board find and conclude that the petition does meet the requirements of 1-1-11(C) of the Wake County Zoning Ordinance and the special use permit be granted subject to the recommended staff conditions 1-7. Ms. Ludwig seconded the motion. All members voted aye. The motion carried by a vote of 5-0.

**Item 6, BA SU-1923-01**

(HIGHWAY 55 GOLF)

The petitioner requests special use approval to construct and operate a Construction and Demolition Debris (C&D) landfill and a recycling facility.

Petitioner: Griffin Brothers, Companies  
Ronald Gilkerson - Geologist  
Landowner: FON Associates  
PIN#: 0740.02 55 8687  
Location: Old Smithfield Road, Holly Springs Township  
Zoned: Industrial-I  
Land Area: 200.10 Acres

Item No.6 heard at the regular meeting of the Wake County Board of Adjustment held on August 14, 2001 was for a special use permit, Petition No. BA SU-1923-01. The petitioner is Griffin Brothers Companies. The landowner is FON Associates. The following members of the Board heard and decided the application: Chairman Alphin, Ms. Ludwig, Mr. Szeker, Mr. Raxter and Mr. Odom.

In this case, the petitioner requests special use approval to construct and operate a Construction and Demolition Debris (C&D) landfill and a recycling facility.

Mr. Steve Williams, 7716 Chapel Hill Road, Raleigh, North Carolina 27607; Mr. Jonathan Reid, 9900 Capital Valley Court, Charlotte, North Carolina; Mr. Larry Griffin, Huntersville, North Carolina; Mr. Mike Griffin 19109 West Catawba Avenue, Cornelius, North Carolina 28031; Ron Gilkerson, 11743 Trail End Lane, Huntersville, North Carolina; and Mr. Tom Worth, Jr., P.O. Box 1799, Raleigh, North Carolina 27602, appeared in support of the petition. All were properly sworn.

## SYNOPSIS OF TESTIMONY AND EVIDENCE PRESENTED

Documentary Evidence: Staff Report, Staff PowerPoint presentation; Staff videotape presentation of the site; Special Use Permit Petition dated 5/30/01; Statement of Justification; Board of Adjustment Minutes dated October 12, 1999; Application for Special Use Permit Proposed HWY 55 C&D Landfill and Recycling Center, Wake County, North Carolina dated May 2001; Wake County Geographic Information Services Map dated 7/11/01; Four (4) site photographs, north view, east view, south view and west view; Wake County Geographic Information Services Map Aerial Photograph dated 7/30/01; *Contract for Purchase of Access from Stewart and Woodell families.*

### Testimony:

Ms. Clark read the staff report stating that the petitioner requests special use approval. On October 12, 1999, the Wake County Board of Adjustment denied a special use request for a C&D landfill to be located on this property (See Board of Adjustment Minutes dated October 12, 1999). The proposed access was shown on the south side of Technology Drive. The special use request before the Board today proposes access to be from Old Smithfield Road.

The property is located west of NC Hwy.55 and north of Old Smithfield Road within the Holly Springs Township. The proposed C&D landfill and recycling center will encompass approximately 40 acres of the total 200-acre site. The C&D landfill is proposed for 39 acres, and the recycling center is proposed for one (1) acre. The 200-acre tract of land is bisected with the Western Wake Expressway. The proposed landfill and recycling center will be located entirely on the south side of the proposed expressway. No part of the proposed uses will be located on that part of the property north of the expressway. Access to the site will be a road off Old Smithfield Road, located approximately 300 feet west of the new NC-55 Bypass/Old Smithfield Road intersection.

Types of waste that are allowed within construction debris and demolition landfills include: asbestos, inert debris similar to types deposited in LCID landfills, asphalt, solid waste resulting from construction, remodeling, repair, or demolition operations on pavement, buildings, or other structures (items such as furniture, carpet remnants, and any other waste material resulting from the demolition of a structure).

The petitioner proposes to recycle approximately 20 percent of the land clearing and other construction and demolition debris materials at the site. The recycling center will include a convenience center to accept yard waste materials for composting and mulching services. A 100-foot buffer will be maintained from the recycling and reprocessing area to the property line, a 200-foot buffer will be maintained around the entire perimeter of the proposed landfill, and a 500-foot buffer will be maintained from existing residences and water supply wells.

The proposed landfill will be constructed in four phases. Phase 1 has a capacity of approximately five years. This is based on a waste generation of 11,000 tons per month. The total life span of the landfill is estimated at 20 years. Access roads will be provided around the perimeter of the landfill for maintenance. Temporary access roads will be constructed throughout the operation of the landfill. These roads will be approximately 24 feet wide with side ditches to prevent erosion of the all weather roadway surfaces. An office scale house, scales, and maintenance area will be constructed. The facility will service Wake County and contiguous counties. The hours of operation for the landfill will be Monday through Friday from the hours of 6:00 am to 6:00 pm, and 7:00 am to 12 noon on Saturday. The operations and maintenance plans and specifications for the C & D landfill property are reviewed, permitted and inspected by the North Carolina Department of

*Environment and Natural Resources*, Division of Waste Management. Should the Board of Adjustment approve the special use request, the Wake County Board of Commissioners for the landfill operation prior to opening must approve a franchise. Access is proposed to be from one driveway located on the north side of Old Smithfield Road.

The submitted preliminary site plan appears to satisfy all the applicable zoning regulations concerning this use. The plan includes the 50-foot wide transitional bufferyard, with type "A" opaque screening, as required according to Section 1-1-29, Table 1, as the landfill is considered a low intensity non-residential use. Property north and east of the site is zoned Industrial, property south of the site is zoned Residential with a landfill use, and property west of the site is zoned Residential-80. The anticipated additional traffic will be 200 truck trips per day at full operation. The intersection with NC-55 Bypass will operate at a Level of Service (LOS) B in peak conditions in the peak hours, both without and including the proposed landfill development. All incoming waste will be evaluated for proper disposal.

The site is located within the Long-Range Urban Services Area (LRUSA) associated with the Town of Apex. The proposed construction and demolition debris landfill and recycling facility use is consistent with the Land Use Plan.

Notification letters to adjoining property owners were mailed July 18, 2001. A public hearing placard was placed on the subject site July 26, 2001.

Ms. Clark gave a PowerPoint presentation and videotape presentation of the site.

Chairman Alphin stated that without objection from the Board, the Chair rules that both sides, proponents and opponents, will each be allowed one hour to present their position on this item. There was no objection by the Board.

Chairman Alphin invited the petitioner, and anyone else in the audience, for comments in support of the petition. Mr. Tom Worth Jr., Attorney representing the Griffin Brothers Company, stated that he was present in the fall of 1999 when the Board discussed this case. Some months later he received an inquiry from the Griffin Brothers who had come aboard in connection with that particular piece of property. He stated that he told them that there was no sense in getting new representation, or any representation, until the matter of access had been established different from what was a critical part, in his opinion, of what was otherwise a very creditable case, well presented in October of 1999. He stated that he was later informed that that had been arranged. One of the first things that he did was to get in touch with Mr. Kieran Shanahan, who was representing General Dynamics in fall of 1999 and is now EMC, a significant property owner to the north. He alerted Mr. Shanahan that the case was indeed in the offing and met recently in connection with the case. Mr. Worth presented a map of the entire 200-acre subject property, obtained from the Wake County Geographic Information Services office on August 10, 2001. Technology Drive, the EMC facility, Old Smithfield Road, and the prospective 55 Bypass are shown on the map. In addition, the tract adjacent to county property, which will be used for access, has been placed under contract. The Town of Apex sewer pumping facility is also located on the map. The driveway is proposed to come in next to the sewer pumping facility. Mr. Worth stated that Ms. Clark mentioned a sewer line being laid along the line of property that is under contract to connect EMC with the Town of Apex facility.

Mr. Ron Gilkerson, a geologist by training and experience, presented the history of Griffin Brothers Companies and their three existing operations, the North Mecklenburg Landfill, the Mining Road Landfill in Lancaster, South Carolina, and the Highway 49 Landfill in Harrisburg, North Carolina. Mr. Gilkerson stated that the proposed Hwy. 55 facilities in Apex will be

under the Griffin Brothers guidance and the operation will not be run any differently then the other sites. Mr. Gilkerson discussed the buffers on the site and NCDENR's requirements concerning the tributary of the Little Branch, which runs through the property. He stated that a very comprehensive study *will be required by the State of North Carolina* with regards to drinking water wells and how they are situated in relationship to the site and that the *on site monitoring* wells will be monitored very closely as required by the State of North Carolina. *Preliminary* research has also been done on the ground water movement.

Mr. Gilkerson stated that the estimated goal of 20% recycling of all incoming waste coming into this C&D site is a part of their recycling services. A pre-recycling service proposal has been extended to the Town of Holly Springs and the Town of Apex for their curbside pickup. Utility services, sewer and water, will be provided by the Town of Apex as well as local fire protection. Garbage collection will be provided by Waste Industries and disposed by Wake County. Electrical service will be provided by Carolina Power & Light Company. Soil and Erosion control is part of the permit and Griffin Brothers Companies will abide by all county and state requirements with regard to land quality. Mr. Gilkerson was asked what type of recycling debris the landfill would be collecting. He stated that it would be yard waste materials, tree limbs, and leaves, which are recycled to produce mulch and compost.

Mr. Worth entered *into evidence* the following items as exhibits:

- Exhibit A: Preliminary Special Use Permit Site Plan, Proposed Hwy 55 C&D Landfill & Recycling Center, dated 5/28/01, revised 6/3/01 and 7/10/01
- Exhibit B: Preliminary Special Use Permit Closure Plan, Proposed Hwy 55 C&D Landfill & Recycling Center, dated 5/28/01, revised 6/3/01
- Exhibit C: Revised 6/30/01 Existing Conditions Map, dated 12/01/00
- Exhibit D: Proposed C&D Landfill Site Vicinity Map, date not given.
- Exhibit E: Proposed Wake County C&D Landfill Site Access Location Map, (date not given)
- Exhibit F: Memo from Parsons, Brinckerhoff, Quade & Douglas, Inc., dated 8/10/01
- Exhibit G: Williams Appraisers Inc. letter, dated 8/13/2001
- Exhibit H: Map of Wake County Existing C&D Landfills as of 2001
- Exhibit I: Wake County Projected C&D Landfills as of 2003

Mr. Jonathan Reid, Traffic and Transportation Engineer with Parsons, Brinckerhoff, Quade & Douglas, Inc, Charlotte, North Carolina, discussed Exhibits D, E and F. He stated the proposal is to use about 300 feet of frontage along Smithfield Road to access the site. A 200-foot section of roadway parallel to Smithfield Road on the north side has been added. In the future, access to the site will be off of the NC 55 Bypass and the section of Smithfield Road between the Hwy. 55 Bypass and Old NC 55 Hwy. will be designated "No Trucks." Mr. Reid was asked what he considered to be the "peak time." He stated that it would be mid-day to late afternoon.

Mr. Steve Williams, Williams Appraisers, addressed the Board concerning adjoining properties, stating that the area was well suited for this landfill and that he did not feel there would be any adverse impact on the value of the adjoining properties.

Mr. Gilkerson stated there is currently four permitted landfills in Wake County that can accept construction and demolition debris. He stated that by the end of the year 2002, South Wake Landfill would be out of construction and demolition space and by the end of next year, 2002, the North Wake facility will be out of capacity. He stated that the BFI Holly Springs Landfill cannot operate beyond December 2002 and the Shotwell facility can serve only the eastern part of the county.

Chairman Alphin asked if there were other interested parties wishing to speak in support of the petition. There was none. Chairman Alphin asked if there were other interested parties wishing to speak in opposition of the petition.

Ms. Nancy Walker, adjacent property owner, 2708 Tingen Road, was sworn. Ms. Walker stated that she owns 46 acres, which has been on the market since 1988. She stated that the only thing separating her property from the proposed landfill is a creek and Old Smithfield Road. Also located in the vicinity of her property is the Wake County Rifle Range. Ms. Walker stated that she appeared in opposition to this landfill in fall of 1999. She stated that in fall of 1999, statements were made that BFI would close in December of 1999. It did close for one month. However, BFI is still operating. Ms. Walker stated that despite the tonnage figures presented to the Board, she could only count the number of trucks that pass by her home. Ms. Walker stated concerns about Hwy. 55 through Apex remaining a two-lane road causing much congestion without any plan to address the problem. She stated that she has observed that the truck drivers have found an alternate route to the landfill using Tingen Road. She stated that "peak time," in her observation, is 5:05 pm. Ms. Walker was concerned that asbestos will be dumped in the landfill. She stated that she is not convinced that the trash will be checked prior to dumping. She expressed her concern that the multi-lane major thoroughfares are all being constructed in the northern part of the county.

Chairman Alphin asked others who wish to speak in opposition not to be repetitive. He stated that there is nothing in the requirements nor any regulations that require the Board of Adjustment take into consideration the distribution of these types of facilities throughout the County of Wake.

Mr. Brad Hostetler, 717 Guadeloupe Court, Holly Springs, North Carolina was sworn. Mr. Hostetler stated that, in his opinion, there are a lot of hidden costs in dealing with a landfill. All of the materials presented need to be verified.

Mr. John Schifano, 413 Arbor Creek Drive, Holly Springs, North Carolina was sworn. Mr. Schifano stated that he is a lawyer, resident of Holly Springs, a council member of the Town of Holly Springs, and is appearing before the Board of Adjustment on behalf of the Town of Holly Springs to offer evidence. He stated that while he knows that the Board of Adjustment is not sitting as a legislative body but as a quasi-judicial body, the Board cannot determine if this is the best place to put a landfill. However, the Board can determine if there is competent and substantial evidence to determine that the applicant has or has not met the criteria when rendering a decision based on fact and law in granting or denying a conditional use permit. The permit may be denied if it makes contrary findings, which are also supported by competent material evidence. As the applicant was entitled to prove a need in the area, others are also entitled to counter that need. Mr. Schifano also stated that the traffic predictions are based on a road, the Highway 55 Bypass, that does not exist and may not exist. If the Board is incline to approve this permit, Mr. Schifano asked that it be tabled so that more detailed analysis can be done or wait until the Highway 55 Bypass actually opens.

Mr. Schifano stated that currently, this area is over burdened with landfills and truck traffic. This is the evidence that must be considered by the Board. Chairman Alphin asked Mr. Schifano if the Highway 55 project has been funded by the DOT. Mr. Schifano responded that it is his understanding that everything has been funded but are subject to being withdrawn by the Governor. Chairman Alphin asked if the project was under construction. Mr. Schifano responded, yes. Mr. Schifano referred to the other towns in the area with large growth in residences equal to Holly Springs and stated that if Holly Springs were

disproportionate in its growth, maybe it would deserve to have the landfill located in this area.

Mr. Hank Dickson, 504 Sandy Point Way, Holly Springs, North Carolina was sworn. Mr. Dickson serves as Mayor Pro-Tem on the Holly Springs Town Board. Mr. Dickson stated that, in his opinion, this project does not meet all of the requirements in Section 1-1-11 of the Wake County Zoning Ordinance. He addressed several items listed in the staff report under Special Use Findings and Conclusions. He stated that under Item (a), Considerations 1. Traffic conditions in the vicinity including the affect of additional traffic; the County cannot reasonably expect that every truck will comply with the covered load law. Currently, haulers traveling to the Feltonsville facility ignore it. The Sheriff's Department does not have the manpower to actively enforce this law during hours of landfill operation. The potential of automobile and school bus accidents and damage, as well as fatalities, is more likely when there is debris flying onto roadways. The increase in this type of traffic would endanger public health and safety. Mr. Dickson stated under Item (d), that the use will not substantially injure the value of adjoining or abutting property, or that the use is a public necessity; whether the proposed development is so necessary to the public health, safety and welfare of the general community. He stated that there is other nearby construction and demolition debris landfills in Wake County, as well as in other counties. A new landfill in Wake County, especially near the Town of Holly Springs, who is fighting the landfill stigma, is unnecessary. In addition, the information provided to the Board about the traffic study was incorrect. This landfill is not an extension of Feltonsville, it is a new landfill. With regard to the landfill being in harmony with the area in which it is to be located, this is true. The landfill developers have selected southwest Wake as a place to site landfills. In his opinion, his points conclude that all of the required conditions cannot be reached. He encouraged the Board to deny the petition.

Mr. Van Crandall, 4813 Salem Ridge Road, Holly Springs, North Carolina was sworn. Mr. Crandall stated that Holly Springs and the surrounding area has been burdened with dumps and landfills for over 15 years, perhaps longer. It is time that Wake County Government represents the best interest of the citizens in this area. This property unquestionably would become far more valuable to the future economic base in the Holly Springs area in Wake County, if this use were denied. Mr. Crandall stated his views on the truck traffic and the number of trucks per second at the site. He also expressed his concerns that the increased traffic on Highway 55 would affect emergency response time.

Ms. Ann Allen, 612 Oak Hollow Drive, Holly Springs, North Carolina was sworn. Ms. Allen stated that her concern is the traffic that will be generated on Highway 55. This landfill will not help with the property values in the area. This landfill is a short-term gain. She asked the Board to look further into the long-term ramifications to the Holly Springs and its citizens. She stated that the location of this landfill would affect the property owners along Highway 55 as well as the businesses, not to mention the commuters that travel this road on a daily basis.

Mr. Greg Whitehouse, 3109 Old Holly Springs-Apex Road, was sworn. Mr. Whitehouse stated that in July 2001, he and his wife received two letters from the County of Wake regarding property for which they are trustees and property of his mother-in-law. According to the letters, the proposed landfill will abutt these properties. Mr. Whitehouse stated that he is a realtor and has knowledge of property value. He disputes the statement by the proponents of the landfill that the location will not affect the value of the property in the area. He asked the Board to consider the affect on the property values, family values, home values and the future of the area by voting denial. While initially BFI did not use the road, BFI is running its landfill loads on a road in front of the Apex Elementary School endangering

public safety. Up until November 2000, when Wake County was topping off the Feltonsville Landfill, at times, there were 600 loads per day. With the mixture of all of these huge trucks and the loading and unloading of school children at Apex Elementary School, this is endangering the lives of the children.

Mr. Chris Smith, 605 Old Scarboro Road, Garner, North Carolina was sworn. Mr. Smith stated that he is representing the property across the street from the proposed landfill. He stated that his property is zoned R-15 which will not allow for residential so he would like to talk to the Town of Holly Springs about building a shopping center on his property. He is in opposition to the location of the landfill.

Mr. Chet Van Faussen, 5104 Wind Dance Place, Holly Springs, North Carolina, was sworn. Mr. Van Faussen stated that he is an architect and that his business, as well as his residence, is located in Holly Springs. He stated that the amount of construction and demolition debris that is hauled away to landfills is quite high.

Mr. Kieran Shanahan, 207 Fayetteville Street Mall, Raleigh, North Carolina, was sworn. He stated that he was representing EMC. This proposal at this time should not be granted because the time is not right. This proposal is surrounded by uncertainty with regard to the bypass, and undeveloped roads. There are currently four major developments and a mall planned in the area. The location of the landfill may directly impact this development. He suggested that the timing for approving a fate-sealing decision would be best to wait until the roads are developed in the area. EMC was hoping that Technology Drive would expand with the surrounding properties being developed by technological companies. A large part of what EMC does is to attract Fortune 500 companies. With the placement of the landfill, this may not materialize. The landfill has a negative adverse impact on the expansion of EMC. In his opinion, the petitioner has failed to meet the all five criteria of the zoning ordinance. The first criteria are not being met due to the addition of the trucks, hours of operation, and the bottleneck created. He stated that the infrastructure is simply not in place to date. The third criteria regarding the value of property is not being met. The harmony with the surrounding area is not in line with the current use of property. With regard to the Wake County Land Use Plan, he is concerned that this landfill will not only serve Wake County, but will serve the surrounding counties, thus being inconsistent with the Land Use Plan. He requested that the Board defer decision on the landfill and vote to deny the petition.

Ms. Leslie Dories, 316 West Elm Avenue, Holly Springs, North Carolina was sworn. She stated that she sits on the Board of Adjustment for the Town of Holly Springs. The first issue is safety. If Highway 55 is not completed on time and this petition is granted, the safety and welfare of the school children in the area is at risk because the roads are not designed to accommodate these large trucks. The second issue is debris. Debris is not secure on these trucks and it flies off of these trucks as they travel to the landfill. Ms. Dories referenced Title 6 of the 1964 Civil Rights Act that addresses the issue of not overburdening minority communities. What is happening in southwest Wake County is very much in line with the spirit of this law.

Chairman Alphin asked if the applicant would like to respond to statements made in opposition of the petition. Mr. Worth stated that with regard to the future expansion of EMC, a portion of the northern tract has been offered to EMC. He stated that the applicant has no interest in access to the landfill from Old Holly Springs Road. The applicant does not seek the opening of the facility until the Highway 55 Bypass is complete. While the right-of-way exists and the applicant has committed to build an access to the landfill, the applicant needs to obtain a driveway permit from the N.C. Department of Transportation. The facility is a 40-acre facility. The 85-acres is the total of the facility and the buffers required. The 85-

acres does not include the 38-acres to the west or the significant acreage to the north of the expressway. Mr. Worth asked that the Board focus on the facts and elements necessary for findings and conclusions.

Ms. Ludwig inquired about the projected opening date. Mr. Worth stated that the commitment is not to open the landfill until the Highway 55 Bypass is complete. Chairman Alphin inquired about the visibility of the facility from the Highway 55 Bypass. Mr. Gilkerson stated that the facility would be heavily tree buffered. At closure, the applicant will put in place a closed out forested area. Mr. Gilkerson stated that the construction and demolition permitting criteria does not allow for acceptance of asbestos. He also stated that under the NCDENR franchise rules, the service area has to be specifically outlined and the applicant is willing to restrict the service area to Wake County only. Mr. Gilkerson stated that the applicant is willing to adjust the hours of operation. Based upon petitioner's determination of need research, the number of trucks per day will increase to approximately 300 from the originally stated 200.

Ms. Ludwig stated that the petition states that the types of materials accepted at a construction and demolition debris landfill includes asbestos. Mr. Gilkerson stated that the landfill would not accept asbestos. Ms. Ludwig also inquired about the service area. Mr. Gilkerson stated that the landfill would restrict its service area to Wake County only. Ms. Ludwig asked how the landfill would restrict the service area. Mr. Gilkerson stated that the applicant is required as a part of the NCDENR tonnage report to justify where the waste is coming from and NCDENR has enforcement under the franchise. Ms. Ludwig asked if there was a responsible party on site that checks for asbestos. Mr. Gilkerson stated that the loads are scrutinized at the weight scale and also as the waste is deposited in the approved cell area.

Chairman Alphin invited Mr. Wayne Woodlief to come forward and clarify the areas of acceptable materials at construction and demolition debris landfills. Mr. Woodlief was sworn. Mr. Woodlief stated that he works with Wake County Facilities and Design Construction addressing capital projects with the solid waste issues. He stated that some neighboring counties restrict incoming waste from other counties. Chairman Alphin asked if this petition were to be restricted for waste from Wake County only, would this create issues. Mr. Woodlief clarified that landfills must report any out-of-county waste. This annual report is furnished to the State. The mechanism for reporting, while most of it is voluntary, persons paying to dump in the landfill provide a way of checking on whether or not the waste is from outside of the county. There is a policing mechanism in place in the dumping industry, where by people let it be known when waste is being dumped by out-of-county individuals.

Chairman Alphin closed the public hearing at this point and invited Board members for findings of fact, conclusions of law and order of the Board.

#### FINDINGS OF FACT, CONCLUSIONS OF LAW AND ORDER OF THE BOARD

Based on the testimony and evidence presented at the hearing, the Board of Adjustment found the following facts:

- (a) The use will not materially endanger the public health or safety if located where proposed and developed;
- (b) The proposed special use will comply with all of the regulations that apply to all general and special uses within the district in which the property is located;

- (c) The proposed special use will comply with all standards expressly applied by this code to that type of special uses or a class of special uses, which includes that type of special use;
- (d) The use will not substantially injure the value of adjoining or abutting property, or that the use is a public necessity; and that the use if developed according to the plan as submitted and approved, will be in harmony with the area in which it is to be located; and
- (e) The use, if located where proposed and developed according to the plan as submitted, will be consistent with the Wake County Land Use Plan.

The Board therefore concluded that the requirements for the Long-Range Urban Services Area associated with the Town of Apex – within the Southwest Area Land Use Plan would be met and that the Special Use Permit should be issued, subject to the following conditions:

- (1) The petitioner must obtain the necessary approvals from the appropriate local, state and federal agencies;
- (2) The petitioner must obtain a driveway encroachment permit from N.C.D.O.T.;
- (3) The petitioner must record a notarized form pertaining to the Order of the Board in the Wake County Register of Deeds and return copy to the Planning Department;.
- (4) A final zoning site inspection to verify site plan compliance must be performed before a Certificate of Compliance is issued by Wake County Inspections/Development Plans/Permits Division; and
- (5) Upon approval of the proposed preliminary site plan and Special Use Permit by the Wake County Board of Adjustment, the applicant shall submit a final site development plan to the Zoning Administrator. The final site development plan shall meet the requirements of Section 1-1-13 and indicate the methods by which the standards of Section 1-1-13 shall be fulfilled, and shall be consistent with the approval of the Special Use petition and preliminary plan.

Mr. Raxter made a motion that in the matter of BA SU-1023-01, that the Board find and conclude that the petition does meet the requirements of 1-1-11(C) and 1-1-13 of the Wake County Zoning Ordinance and that the special use permit be granted with recommended staff conditions 1 through 5. Mr. Odom seconded the motion. All members voted aye. The motion carried by a vote of 5-0.

**Item 7, New Business:**

Ms. Clark stated that the public hearing notification process would go to the Board of Commissioners at its next meeting, amending the administrative process and policies regarding notification.

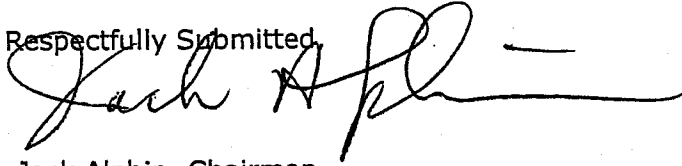
**Item 8, Old Business:**

Mr. Warren stated that the motion to dismiss on the pending appeal is scheduled to be heard the week of September 10, 2001. The appeal will either be dismissed or he will move forward with the appeal.

REGULAR MEETING  
WAKE COUNTY BOARD OF ADJUSTMENT  
AUGUST 14, 2001

All petitions complete, Chairman Jack Alphin declared the regular meeting of the Wake County Board of Adjustment for Tuesday, August 14, 2001 adjourned at 12:25 p.m.

Respectfully Submitted,

A handwritten signature in black ink, appearing to read "Jack Alphin", with a long horizontal flourish extending to the right.

Jack Alphin, Chairman  
Wake County Board of Adjustment

North Carolina  
Department of Environment and Natural Resources

Division of Waste Management

Michael F. Easley, Governor  
William G. Ross Jr., Secretary  
Dexter R. Matthews, Director



August 12, 2002

Mr. Mike L. Griffin  
Griffin Brothers Companies  
d/b/a Highway 55 C&D Landfill, LLC  
19109 W. Catawba Ave.; Suite 118  
Cornelius, North Carolina 28031

Subject: Solid Waste Permit No. 92-30  
Highway 55 C&D Landfill, LLC Construction and Demolition(C&D) Landfill  
Old Smithfield Road, Apex, Wake County, North Carolina.

Dear Mr. Griffin:

The referenced PERMIT TO CONSTRUCT is issued in accordance with N.C.G.S. 130A-294 and the N.C. Solid Waste Management Rules, 15A NCAC 13B, .0201(b)(1). Enclosed is attachment 1, which lists documents included in the Approved Plan. The approved facility description includes the area described in the attached legal description. Within the approved facility, the initial area identified as Phase I (the first five year phase encompassing 17.80 acres) is permitted for construction as shown on Sheet C2 (master site grading plan) and Sheet C3 (Phase I grading plan):

This permit is for the construction of the first five-year phase, Phase I (the first five year phase encompassing 17.80 acres) is permitted for construction as shown on Sheet C3 (Phase I grading plan) dated 6 May 2002 of the approved plans. At the end of the first five-year operational period, Highway 55 C&D Landfill, LLC may apply for an expansion into and construction of Phase 2, but will be subject to all rules in effect at that time. This permit is issued to Griffin Brothers Companies d/b/a Highway 55 C&D Landfill, LLC as the owner and operator of the facility.

Please refer to the GENERAL CONDITIONS of this permit for recordation procedures, the definition of the approved plan, and for general terms of the Solid Waste Permit. The CONSTRUCTION AND OPERATION conditions describe permitted fill areas, acceptable waste types, landfill operation, and requirements which must be satisfied prior to operation of the facility as a Construction & Demolition landfill. Specific requirements for groundwater monitoring and facility record keeping and reporting are described in the MONITORING AND REPORTING conditions.

1646 Mail Service Center, Raleigh, North Carolina 27699-1646  
Phone: 919-733-0692 \ FAX: 919-733-4810 \ Internet: [www.enr.state.nc.us/](http://www.enr.state.nc.us/)

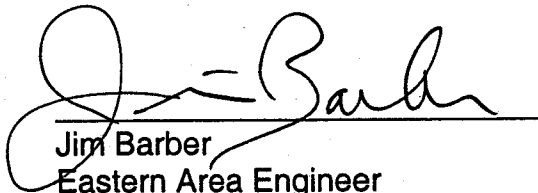
Mr. Griffin  
Page 2  
August 12, 2002

Please review the Conditions of Permit thoroughly, especially the following specific conditions:

- A. Monitoring and Reporting Requirement No. 12(e) requires that the groundwater quality monitoring wells must be installed and sampled prior to accepting waste at this landfill. Please consult with Mr. Bobby Lutfy, Solid Waste Section Project Hydrogeologist at (919) 733-0692, Ext. 258 just prior to well construction to help ensure that completed wells meet well construction standards and will be acceptable for monitoring purposes.

Again, please review the Conditions of Permit thoroughly and contact me if you have any questions or if you require further clarification. Mr. Robert Hearn is the Solid Waste Section Waste Management Specialist for this area and can be contacted at the DENR Raleigh Regional Office by phone at (919) 571-4700. Jim Coffey can be contacted at the Raleigh Central Office at (919) 733-0692 Extension 255 or Jim Barber at (919) 733-0692 Extension 344.

Respectfully,



Jim Barber  
Eastern Area Engineer  
Solid Waste Section  
enclosure

cc: Jim Coffey  
Mark Fry  
Robert Hearn  
Bobby Lutfy  
Dan Brewer  
✓ Raleigh Central File: Wake County; 92-30 Permit File

PERMIT NO.: 92-30  
DATE ISSUED(PTC): 08/12/2002  
DATE ISSUED(PTO): N/A

STATE OF NORTH CAROLINA  
DEPARTMENT OF ENVIRONMENT AND NATURAL RESOURCES  
DIVISION OF WASTE MANAGEMENT  
1646 MAIL SERVICE CENTER; RALEIGH, NC 27699-1646

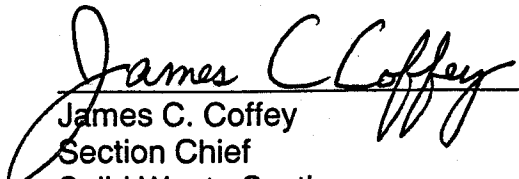
SOLID WASTE PERMIT

Griffin Brothers Companies  
d/b/a Highway 55 C&D Landfill, LLC

is hereby issued a PERMIT TO CONSTRUCT a

Construction and Demolition Landfill unit, PHASE 1 (17.8 acre cell)

located north of and accessed by Old Smithfield Road and west of Highway 55 By-pass and further described by Parcel Identification Number 0740.02-55-8687 in Apex, Wake County, North Carolina in accordance with Article 9, Chapter 130A, of the General Statutes of North Carolina and all rules promulgated thereunder and subject to the conditions set forth in this permit. The facility is located and described by the legal description of the site included with this permit and further identified on the deed recorded for this property in Book: 9099 and Page(s): 1039 - 1044 in the Wake County Register of Deeds for Highway 55 C&D Landfill, LLC.

  
James C. Coffey  
Section Chief  
Solid Waste Section  
Division of Waste Management

**SOLID WASTE PERMIT  
PERMIT TO CONSTRUCT**

Griffin Brothers Companies d/b/a Highway 55 C&D Landfill, LLC  
A Construction and Demolition Debris Landfill Unit - PHASE I

**CONDITIONS OF PERMIT:**

**GENERAL**

1. This PERMIT TO CONSTRUCT will be in effect for eighteen months from date of issuance and may be reviewed under rules in effect at that time if the facility is not constructed within this time frame. Modifications to the facility may be required in accordance with rules in effect at the time of review. This permit shall not be effective unless the PERMIT TO CONSTRUCT along with the certified copy is filed in the Register of Deeds Office, in the grantor index under the name of the owner of the land in the county or counties in which the land is located. This PERMIT TO CONSTRUCT should be referenced and recorded against the deed recorded in Book: 9099 Pages: 1039 thru 1044. The certified copy shall be returned to the Solid Waste Section, within 30 days of receipt of the PERMIT TO CONSTRUCT, and shall have indicated on it the book number, page, date of recordation and the Register's seal.  
When this property is sold, leased, transferred or conveyed, the deed or other instrument of transfer shall contain in the description section in no smaller type than that used in the body of the deed or instrument, a statement that the property has been used as a sanitary landfill.
2. The approved plan is described by Attachment 1, "List of Documents for Approved Plan". Where discrepancies may exist, the most recent submittal and the Conditions of Permit shall govern. Some components of the approved plan are reiterated in the Conditions of Permit.
3. This permit is not transferable.
4. This permit is for a period of five years from the date of the PERMIT TO OPERATE and is subject to review on or before the date of the PERMIT TO OPERATE as per 15A NCAC 13B .0201(c). Modifications to the facility may be required in accordance with the rules in effect at the time of the review.
5. The service area for this facility consists of the County of Wake and its municipalities. The disposal capacity for the facility (PHASE 1) is approximately 858,000 cubic yards(appendix 1 - landfill capacity and borrow soil calculations), consistent with the final contours as shown on SHEET C5 (phase I closure plan) in the construction application. This capacity is based the receipt of approximately 300,000 tons/year based on operating 6 days/week (approx. 312 days/ year), with a maximum variance in accordance with GS 130A-294(b1)(1) and consistent with the approved franchise granted by the County of Wake dated 3 December 2001.

## CONSTRUCTION

6. This permit is for the construction of Griffin Brothers Companies d/b/a Highway 55 C&D Landfill, LLC Construction and Demolition(C&D) Landfill unit denoted as Phase 1 in accordance with the site plan SHEET C3, titled " Phase I GRADING PLAN". Prior to placing waste in areas of Phase 1, consistent with the above mentioned drawing, certification that Phase 1 has been constructed and graded in accordance with the approved plans will be required.
7. All sedimentation/erosion control activities will be conducted in accordance with the Sedimentation Control Act codified at 15 NCAC 4. Native vegetation shall be established on the completed C&D landfill unit in accordance with 15A NCAC 13B .0505 (3)(b)(c).
8. The following requirements shall be met prior to operation of PHASE 1(i.e. Prior to the issuance of a PERMIT TO OPERATE):
  - a. PHASE 1 preparation shall be in accordance with the construction plan, SHEET C3, and the conditions specified herein; and construction of PHASE 1 shall be certified by the design engineer to be constructed in accordance with the approved plans.
  - b. PHASE 1 unit inspection shall be made by a representative of the Division of Waste Management (DWM) with the owner/operator.
  - c. Signs shall be posted at the entrance of Highway 55 C&D Landfill, LLC landfill, in accordance with the Access and Safety Requirements under Operation Condition .0505(8).
  - d. Groundwater monitoring wells (see Monitoring and Reporting Requirements) shall be installed consistent with condition 14(a) thru (g). A baseline sampling for water quality shall be performed. Well construction records, soil boring logs and sample analysis results shall be submitted to the Section Hydrogeologist for review and approval prior to operation of the C&D unit. Additional interim ground water monitoring well(s) shall be installed to the south and east of the PHASE 1 footprint, within the review boundary for PHASE 1, at the design hydrogeologist recommended locations. A proposed location plan for the additional well(s) shall be submitted to the Solid Waste Section for review and concurrence.
  - e. Inspection and certification of the PHASE 1 subgrade, by the project hydrogeologist, to determine if subgrade conditions are consistent with the observations made during the initial site investigations and information provided in the site hydrogeology report. If conditions found are different than conditions stated in the hydrogeologic report or that would impact or have an effect on the proposed ground water monitoring system; then a revised ground watering monitoring plan will be required.
  - f. No blasting shall take place on the site unless a pre-blast survey is performed and a blasting plan is submitted to the Solid Waste Section for review and concurrence.

- g. All well construction records and soil boring logs( for existing and new wells), along with sample analysis results shall be submitted to the Section Hydrogeologist for review and approval prior to operation of the C&D unit.

**OPERATION:**

9. This C&D unit (PHASE 1) is permitted to receive the following waste types:
- Land-clearing debris as defined in G.S. 130A-290, specifically, solid waste which is generated solely from land-clearing activities, such as stumps, trees;
  - Inert debris defined as solid waste which consists solely of material that is virtually inert, such as brick, concrete, rock and clean soil; and
  - Asphalt in accordance with G.S. 130-294(m).
  - Construction and demolition debris defined as solid waste resulting solely from construction, remodeling, repair or demolition operations on pavement, buildings, or other structures.

Yard trash as defined in G.S. 130A-290, shall not be disposed in the landfill area. However, yard trash, along with land-clearing debris, may be accepted for processing in the Yard Waste Composting Area or disposed of in a LCID landfill.

10. Operation of the C&D landfill unit shall conform to the operating procedures described in the approved plan, in accordance with Section .0505 of the Solid Waste Management Rules, and in accordance with the following requirements:
- Waste Acceptance and Disposal.
- The C&D unit shall accept only those solid wastes which it is permitted to receive as outlined in condition 9.
  - No municipal solid waste, hazardous waste, or liquid waste shall be accepted for disposal in the C&D unit.
  - The permittee shall implement a program for the C&D unit for detecting and preventing the disposal of MSW, hazardous or liquid wastes. The program shall include, at a minimum:
    - Random inspections of incoming loads or other comparable procedures;
    - Records of any inspections;
    - Training of personnel to recognize hazardous and liquid wastes;
    - Development of a contingency plan to properly manage any identified hazardous, liquid or MSW wastes; The plan must address identification, removal, storage, and final disposition of waste.

**Cover Material Requirements**

- Operational soil cover of at least six inches shall be placed at least once per week or when the active area reaches ½ acre in size, or more often as necessitated by the nature of the waste, as to prevent the site from becoming a visual nuisance and to prevent fire, windblown materials, vectors, or excessive water infiltration.
- Areas which will not have additional waste placed on them for 12 months or more, but where final termination of operations has not occurred, shall be covered with a minimum of one foot of soil cover [15A NCAC 13B .0505(3)(b)].

- f. After final termination of disposal operations at the C&D unit or major part thereof, or upon revocation of a permit, the fill areas shall be covered with at least two feet of suitable compacted earth [15A NCAC 13B .0505(3)(c)] or a cap as specified by the rules in effect at the time of closure.

#### Access and Safety

- g. The C&D unit shall be adequately secured by means of gates, chains, berms, fences, or other security measures approved by the DWM to prevent unauthorized entry.
- h. An attendant shall be on duty at the Highway 55 C&D Landfill, LLC landfill at all times while it is open for public use to ensure compliance with operational requirements.
- i. The access road from Old Smithfield Road to the C&D unit shall be of all-weather construction and maintained in good condition.
- j. Dust control measures shall be implemented when necessary.
- k. Signs providing information on dumping procedures, the hours of operation, the permit number, and other pertinent information shall be posted at the entrance to the Highway 55 C&D Landfill, LLC landfill.
- l. Signs shall be posted stating that no MSW, hazardous waste or liquid waste can be received in the C&D unit.
- m. Traffic signs or markers shall be provided as necessary to promote an orderly traffic pattern to and from the discharge area and to maintain efficient operating conditions.
- n. The removal of solid waste from the facility is prohibited unless the owner/operator approves and the removal is not performed on the working face. If C&D recycling is to take place in the future; amendment of the operations plan shall be submitted to the Solid Waste Section for approval.
- o. Barrels and drums shall not be disposed of unless they are empty and perforated sufficiently to ensure that no liquid or hazardous waste is contained therein, except fiber drums containing asbestos. Asbestos waste shall be managed in accordance with 40 CFR 61.
- p. Open burning of solid waste is prohibited. Fires shall be reported to the Solid Waste Section by phone within 24 hours of an incident and written notification shall be submitted within 14 working days addressing the events at the site and future actions to be taken in the future to avoid and or mitigate potential fire hazards.
- q. The concentration of explosive gases generated by the C&D unit shall not exceed:
- i. twenty-five percent of the lower explosive limit(1.25% of CH<sub>4</sub>) for gases in site structures (excluding gas control or recovery system components if necessary; and
  - ii. One hundred percent of the lower explosive limit(5% CH<sub>4</sub>) for gases at the property boundary. Installation of permanent gas monitoring wells may be required in the future to demonstrate compliance.

#### Erosion and Sedimentation Control

- r. Adequate sedimentation and erosion control measures shall be practiced to prevent silt from leaving the site of the C&D unit.
- s. Adequate sedimentation and erosion control measures shall be practiced to prevent excessive on-site erosion.
- t. Provisions for a vegetative ground cover sufficient to restrain erosion must be accomplished within 30 working days or 120 calendar days upon completion of any phase of C&D landfill unit development or as addressed in the approved Sedimentation and Erosion Control permit.

#### Drainage Control and Water Protection Requirements

- u. Surface water shall be diverted from the operational area.
  - v. Surface water shall not be impounded over or in waste.
  - w. A separation distance of at least four feet shall be maintained between the C&D waste and the groundwater table; as addressed in the site suitability application, hydrologic assessment section.
  - x. Solid waste(C&D) shall not be disposed of in water.
  - y. Leachate shall be contained on site or properly treated prior to discharge. An NPDES permit may be required prior to discharge of leachate to surface waters and or for land disturbing activities greater than one acre.
- 11. All pertinent landfill operating personnel will receive training and supervision necessary to properly operate this C&D landfill unit in accordance with G.S. 130A-309.25 and addressed by memorandum dated 29 November 2000(enclosed).
  - 12. Ground water quality for the C&D landfill unit is subject to the classification and remedial action provisions referenced in Rule .0503 (2)(d) of 15A NCAC 13B.
  - 13. A closure and post-closure plan must be submitted for approval at least 90 days prior to closure or partial closure of any landfill unit. The plan must include all steps and measures necessary to close and maintain the C&D unit in accordance with all rules in effect at that time. At a minimum, the plan shall address the following:
    - a. Design of a final cover system as required by the solid waste management rules in effect at the time of closure;
    - b. Construction and maintenance/operation of the final cover system and erosion control structures;
    - c. Surface water, ground water, and explosive gas monitoring.

#### MONITORING AND REPORTING REQUIREMENTS

- 14. Ground-water monitoring wells and monitoring requirements for the C&D landfill unit:
  - a. Monitoring well design and construction shall conform to the specifications outlined in, "North Carolina Water Quality Monitoring Guidance Document for Solid Waste Facilities-DRAFT" and water quality sampling and analysis shall be done in accordance with Construction and Demolition landfills and Closed Sanitary Landfills

- b. A total of seven locations for ground water wells ( MW-1 upgradient and MW-2, MW-3, MW-4, MW-5, MW-6 and MW-7 downgradient locations for Phase I) and four surface water locations (SW-1, SW-2, SW-3 and SW-4) [in accordance with the Groundwater Monitoring Plan, as part of the Site Suitability Plan dated 19 April 2002 by Enviro-Pro, P.C.].
  - c. A geologist shall be in the field to supervise well installation. The exact locations, screened intervals, and nesting of the wells shall be established after consultation with the SWS Hydrogeologist at the time of well installation.
  - d. For each monitoring well constructed, a well completion record shall be submitted to DWM within 30 days upon completion.
  - e. Prior to the acceptance of any waste at the C&D unit, a baseline sampling event shall be completed and analysis submitted to the SWS Hydrogeologist.
  - f. Sampling equipment, procedures, and parameters shall conform to specifications outlined in the above-referenced guidance document, [Monitoring and Reporting Requirements, condition 14(a) pg. 8] or the current guidelines established by DWM at the time of sampling.
  - g. In order to determine ground-water flow directions and rates, each monitoring well shall be surveyed, and hydraulic conductivity values and effective porosity values shall be established for the screened intervals for each monitoring well.
  - h. The permittee shall sample the monitoring wells semi-annually or as directed by the SWS Hydrogeologist. In addition to the wells described in condition 14(b); surface water locations SW-1, SW-2, SW-3 and SW-4 shall also be sampled semi-annually as part of the monitoring system.
  - i. A readily accessible unobstructed path shall be initially cleared and maintained so that four-wheel drive vehicles may access the monitoring wells at all times.
15. The permittee shall maintain a record of all monitoring events and analytical data. Reports of the analytical data for each water quality monitoring sampling event shall be submitted to DWM in a timely manner.
16. The permittee shall maintain a record of the amount of solid waste received at the C&D unit, compiled on a monthly basis. Scales shall be used to weigh the amount of waste received.
17. On or before 01 August 2003, and each year thereafter, the permittee shall report the amount of waste received (in tons) at the C&D unit and disposed of in the C&D landfill unit to the Solid Waste Section and to all counties from which waste was accepted, on forms prescribed by the Section. This report shall include the following information:
- a. The reporting period shall be for the previous year, beginning 01 July and ending on 30 June;

- b. The amount of waste received and landfilled in tons, compiled on a monthly basis, and;
  - c. Documentation that a copy of the report has been forwarded to all counties from which waste was accepted.
18. All records shall be maintained on-site and made available to the SWS upon request, specifically records generated by conditions 10, 11, 13, 14, 15, 16 & 17.

Prepared by ~~Robert M. Lee~~

Poyner & Spruill L.L.P. (RWW)  
(without title examination)  
Post Office Box 10096  
Raleigh, NC 27605

Mail To: Grantee

Excise \$2,480.00

Out of 0072826

Wake County, NC 1006  
Laura M. Riddick, Register of Deeds  
Presented & Recorded 10/01/2001 16:09:02  
State Of NC Real Estate Excise Tax: \$2480  
Book: 009089 Page: 01039 - 01044

### NORTH CAROLINA GENERAL WARRANTY DEED

THIS DEED is made this 24<sup>th</sup> day of September, 2001, from FON ASSOCIATES LIMITED PARTNERSHIP, a North Carolina limited partnership (the "Grantor"), to HIGHWAY 55 C&D LANDFILL, LLC, a North Carolina limited liability company (the "Grantee"), with a mailing address of 19109-110 W Catawba Ave. Cornelius, NC 28031.

#### WITNESSETH:

For and in consideration of \$1.00 cash in hand paid and other good and valuable consideration, the receipt and sufficiency of which is hereby acknowledged, Grantor has and by these presents does grant, bargain, sell and convey unto Grantee in fee simple, all that certain lot or parcel of land situated in Wake County, North Carolina, more particularly described on Exhibit A attached hereto and by this reference made a part hereof:

TO HAVE AND TO HOLD the aforesaid lot or parcel of land and all privileges and appurtenances thereto belonging to the Grantee in fee simple.

Grantor covenants with Grantee that Grantor is seized of said land in fee simple, that Grantor has the right to convey the same in fee simple, that title is marketable and free and clear of all encumbrances, and that Grantor will warrant and defend the title against the lawful claims of all persons whomsoever, except for those exceptions described on Exhibit B attached hereto and by this reference made a part hereof.

The designation "Grantor", and "Grantee" as used herein shall include said named parties and their respective heirs, successors and assigns, and shall include the singular, plural, masculine, feminine or neuter as required by context.

IN WITNESS WHEREOF, the undersigned has executed this instrument under seal as of the day and year first above written.

FON ASSOCIATES LIMITED PARTNERSHIP  
a North Carolina limited partnership (SEAL)

By  (SEAL)  
Shie-Shin Wu, General Partner

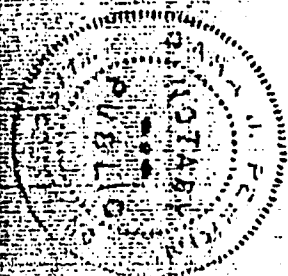
STATE OF NORTH CAROLINA  
COUNTY OF WAKE

I, a Notary Public of the County and State aforesaid, certify that Shic Shin Wu, personally appeared before me, who, being by me duly sworn, says that he is General Partner of FON ASSOCIATES LIMITED PARTNERSHIP., a North Carolina limited partnership, and that the said writing was signed by them in behalf of said limited partnership as their act and deed and as the act and deed of said limited partnership.

WITNESS my hand and notarial seal, this 1<sup>st</sup> day of October, 2001.

Sara J. Perrin  
Sara J. Perrin Notary Public

My Commission Expires: 01/01/2006



## EXHIBIT "A"

BEGINNING at a point located in Falls Branch, said point being located North 70 degrees 30 minutes 09 seconds West 2709.93 feet from a mag nail located in the centerline of S. R. 1172 (a/k/a Old Smithfield Rd.) and the centerline of Highway 55, said point also being the POINT AND PLACE OF BEGINNING, thence along the run of Falls Branch Creek the following calls and distances: South 70 degrees 17 minutes 40 seconds West 82.58 feet to a point, thence North 42 degrees 11 minutes 55 seconds West 197.13 feet to a point, thence South 70 degrees 16 minutes 53 seconds West 125.20 feet to a point, thence South 01 degrees 50 minutes 53 seconds West 120.77 feet to a point, thence South 70 degrees 44 minutes 34 seconds West 156.46 feet to a point, thence North 75 degrees 48 minutes 30 seconds West 99.08 feet to a point, thence South 66 degrees 50 minutes 57 seconds West 127.49 feet to a point, thence South 46 degrees 59 minutes 42 seconds West 104.40 feet to a point, thence South 29 degrees 30 minutes 11 seconds West 155.68 feet to a point, thence South 53 degrees 28 minutes 52 seconds West 162.59 feet to a point, thence South 88 degrees 57 minutes 41 seconds West 156.63 feet to a point, thence South 09 degrees 55 minutes 53 seconds West 72.11 feet to a point, thence South 82 degrees 32 minutes 55 seconds West 246.55 feet, thence South 25 degrees 00 minutes 16 seconds West 112.16 feet to a point, thence North 58 degrees 34 minutes 44 seconds West 89.83 feet to a point, thence South 77 degrees 55 minutes 10 seconds West 104.07 feet to a point, thence North 55 degrees 08 minutes 41 seconds West 128.16 feet to a point, thence North 46 degrees 20 minutes 01 seconds West 160.15 feet to a point, thence South 66 degrees 30 minutes 35 seconds West 95.59 feet to a point, thence North 45 degrees 46 minutes 13 seconds West 87.66 feet to a point, thence South 73 degrees 24 minutes 16 seconds West 114.69 feet to a point, thence South 11 degrees 10 minutes 12 seconds East 87.05 feet to a point, thence North 62 degrees 13 minutes 03 seconds West 106.40 feet to a point, thence South 83 degrees 26 minutes 30 seconds West 152.16 feet to a point, thence South 32 degrees 29 minutes 39 seconds West 85.70 feet to a point, thence North 56 degrees 55 minutes 23 seconds West 163.19 feet to a point, thence South 65 degrees 16 minutes 36 seconds West 230.69 feet to a point, thence North 61 degrees 40 minutes 39 seconds West 269.37 feet to a point, thence North 41 degrees 39 minutes 35 seconds West 233.34 feet to a point, thence South 73 degrees 22 minutes 35 seconds West 210.49 feet to a point, thence South 60 degrees 14 minutes 01 seconds West 206.57 feet to a point, said point being the final point located in the run of Falls Branch Creek, thence North 19 degrees 08 minutes 52 seconds West 169.59 feet to an iron pipe, thence North 54 degrees 25 minutes 57 seconds West 325.79 feet to an iron pipe, thence North 69 degrees 25 minutes 11 seconds West 183.82 feet to an iron pipe, thence North 73 degrees 57 minutes 20 seconds West 219.38 feet to an iron pipe, thence North 77 degrees 55 minutes 48 seconds West 217.53 feet to an iron pipe, thence North 05 degrees 34 minutes 39 seconds West 998.63 feet to a point, thence South 80 degrees 04 minutes 02 seconds East 106.02 feet to a point, thence South 82 degrees 38 minutes 07 seconds East 1467.38 feet to a point, thence South 88 degrees 20 minutes 16 seconds East 672.04 feet to a point, thence South 80 degrees 54 minutes 58 seconds East 580.68 feet to a point, thence North 88 degrees 37 minutes 31 seconds East 704.64 feet to a point, thence South 80 degrees 29 minutes 29 seconds East 647.01 feet to a point, thence South 53

degrees 46 minutes 40 seconds East 472.48 feet to a point, thence South 03 degrees 27 minutes 32 seconds West 400.96 feet to the POINT AND PLACE OF BEGINNING, containing 116.333 acres and being designated as Tract "C" on an unrecorded survey entitled "Property Survey for Highway 55 C & D Landfill, LLC", dated 9/22/01 and prepared by Patterson, Brewer & Associates.

This tract is a portion of the same tract of land referred to as Tract 3 in Deed Book 3850, Page 359, Wake County Registry.

## EXHIBIT B

1. Lien of ad valorem taxes for the year 2002 and subsequent years.
2. Right of way of Technology Drive.
3. Right of way of Dixie Pipeline recorded in Book 1484, Page 239, Wake County Registry.
4. Right of way to Data General Corporation recorded in Book 2829, Page 177 and Book 2791, Page 428, Wake County Registry.
5. Wastewater Utility Easement to County of Wake recorded in Book 3059, Page 118, Wake County Registry.
6. Easement Agreement and Quit-Claim to Fred G. Cash, Jr. and Annie Ruth Cash Maynard for perpetual ingress and egress across subject property recorded in Book 4454, Page 661, Wake County Registry.
7. Utility easement to Carolina Power & Light Company recorded in Book 8419, Page 2323, Wake County Registry.
8. Memorandum of Action for eminent domain taking of perpetual sewer easement recorded in Book 8943, page 596 Wake County Registry.
9. Future right of way to Department of Transportation for construction of I-540 Western Wake Expressway.

Wake County, NC 275  
Laura M Riddick, Register Of Deeds  
Presented & Recorded 07/09/2002 12:40:12  
State Of NC Real Estate Excise Tax : \$220  
Book : 009408 Page : 00922 - 00924

Excise Tax \$ 220.00

Recording Time, Book and Page

Tax Lot No. \_\_\_\_\_ Parcel Identifier No. Out of 0740.04 - 64 - 9391  
Verified by Wake County on the \_\_\_\_\_ day of \_\_\_\_\_ 2002 by \_\_\_\_\_

After recording mail to: Grantee

This Instrument was prepared by: Kilpatrick Stockton LLP (JAB) without title examination

Brief description for the Index

### NORTH CAROLINA SPECIAL WARRANTY DEED

THIS DEED made this 1<sup>st</sup> day of July, 2002, by and between

#### GRANTOR

R. Markham Stewart and wife, Ruth B. Stewart, a 50% undivided interest, as tenants by the entireties

Melissa S. Woodell and husband, Anthony K. Woodell, a 50% undivided interest, as tenants by the entireties

#### GRANTEE

Highway 55 C&D Landfill, LLC, a NC limited liability company

19109-110 W. Catawba Avenue  
Cornelius, NC 28631

Enter in appropriate block for each party: name, address, and, if appropriate, character of entity, e.g. corporation or partnership.

The designation Grantor and Grantee as used herein shall include said parties, their heirs, successors, and assigns, and shall include singular, plural, masculine, feminine or neuter as required by context.

WITNESSETH, that the Grantor, for a valuable consideration paid by the Grantee, the receipt of which is hereby acknowledged, has and by these presents does grant, bargain, sell and convey unto the Grantee in fee simple, in all that certain lot or parcel of land situated in the Township of Cotton Grove, County of Wake, State of North Carolina, and more particularly described as follows:

Being all of Tract A, containing approximately 0.963 acres, more or less, as shown on that map entitled "Final Plat for R. Markham & Ruth B. Stewart, Anthony K. & Melissa S. Woodell HWY 55 C&D Landfill, LLC Redivision of 10.33 Acres Site As Shown On Book of Maps 2002, Page 35", prepared by Patterson Brewer & Associates, dated May 2, 2002, and recorded in Book of Maps 2002, Page 1159, Wake County Registry.

The property hereinabove described was acquired by Grantor by instrument recorded in Book 9121 Page 1284 and Book 8729 Page 644, Wake County Registry.

TO HAVE AND TO HOLD the aforesaid lot or parcel of land and all privileges and appurtenances thereto belonging to the Grantee in fee simple.

And the Grantor covenants with the Grantee, that Grantor has done nothing to impair such title as Grantor received, and Grantor will warrant and defend the title against the lawful claims of all persons claiming by, under or through Grantor, except for the exceptions hereinafter stated.

Title to the property hereinabove described is subject to the following exceptions:

1. Taxes for the year 2002 and subsequent years not yet due and payable.
2. Zoning ordinances in effect.
3. All easements, restrictions and rights-of-way of record.

IN WITNESS WHEREOF, the Grantor has hereunto set his hand and seal, or if corporate, has caused this instrument to be signed in its corporate name by its duly authorized officers and its seal to be hereunto affixed by authority of its Board of Directors, the day and year first above written.

R. Markham Stewart (seal)  
R. Markham Stewart

Ruth B. Stewart (seal)  
Ruth B. Stewart

Melissa S. Woodell (seal)  
Melissa S. Woodell

Anthony K. Woodell (seal)  
Anthony K. Woodell

STATE OF NORTH CAROLINA

COUNTY OF Lee

I, Jeffrey Now, Notary Public of Lee County, State of North Carolina, certify that R. Markham Stewart, and wife Ruth B. Stewart, Grantor, personally appeared before me this day and acknowledged the due execution of the foregoing instrument.

WITNESS my hand and official stamp or seal, this 15 day of July, 2002.

My commission expires:  
My Commission Expires March 08, 2005

Jeffrey Now  
Notary Public

(Official Seal)

STATE OF NORTH CAROLINA

COUNTY OF Lee

I, Jeffrey Now, Notary Public of Lee County, State of North Carolina, certify that Melissa S. Woodell, and husband Anthony K. Woodell, Grantor, personally appeared before me this day and acknowledged the due execution of the foregoing instrument.

WITNESS my hand and official stamp or seal, this 15 day of July, 2002.

My commission expires:  
My Commission Expires March 08, 2005  
46894-249733  
RALLIB01:630107.1

Jeffrey Now  
Notary Public

(Official Seal)

Laura M Riddick  
Register of Deeds  
Wake County, NC



Book : 009488 Page : 00922 - 00924

Yellow probate sheet is a vital part of your recorded document.  
Please retain with original document and submit for rerecording.



Wake County Register of Deeds  
Laura M. Riddick  
Register of Deeds

North Carolina - Wake County

The foregoing certificate \_\_\_ of \_\_\_\_\_

\_\_\_\_\_  
*Jeffrey C. Tow*  
\_\_\_\_\_

\_\_\_\_ Notary(ies) Public is (are) certified to be correct. This instrument and this certificate are duly registered at the date and time and in the book and page shown on the first page hereof.

Laura M. Riddick, Register of Deeds

By: *Fredrick C. Bayman*  
Assistant/Deputy Register of Deeds

This Customer Group  
\_\_\_\_ # of Time Stamps Needed

This Document  
\_\_\_\_ New Time Stamp  
\_\_\_\_ # of Pages

19

## ATTACHMENTS

### GRIFFIN BROTHERS COMPANIES d/b/a HIGHWAY 55 C&D LANDFILL, LLC

#### List of Documents for the Approved Plan

##### SITE SUITABILITY:

1. Report - Site Application - Highway 55 C&D Landfill and Recycling Center - prepared for Highway 55 C&D Landfill, LLC Construction & Demolition Landfill - Wake County, North Carolina; application dated 19 April 2002 and received 24 April 2002 from Enviro-Pro, P.C.;
2. Response to Comment dated 19 March 2002 - Site Suitability Permit Application, response received 24 April 2002 and 8 May 2002 from Enviro-Pro for information dated 19 April 2002 and 7 May 2002;
3. Second Response to Comment letter dated 3 July 2002 - Site Suitability Permit Application - response dated 11 July 2002 "Revised Site Plan Application Report" from Enviro-Pro;
4. Certified minutes from Wake County dated 3 December 2001 and 19 November 2001 indicating the vote of the Wake County Commissioners in approving the franchise for Highway 55 C&D Landfill, LLC, received in the Revised Site Suitability application dated April 2002 received 24 April 2002;
5. Special Use Permit recorded in Deed Book: 9099 and Pages: 1039 thru 1044, as part of the Site Suitability application dated April 2002 received 24 April 2002;

##### CONSTRUCTION:

6. Deed description for re-combination of properties consisting of Book: 9099 and Pages: 1039 - 1044 representing 116.333 acres and Book: 9488 and Pages: 0922 - 0923 representing .963 acres.

North Carolina  
Department of Environment and Natural Resources

Division of Waste Management

Michael F. Easley, Governor  
William G. Ross Jr., Secretary  
Dexter R. Matthews, Director

December 27, 2002



Mr. Mike L. Griffin  
Griffin Brothers Companies  
d/b/a Highway 55 C&D Landfill, LLC  
19109 W. Catawba Ave.; Suite 118  
Cornelius, North Carolina 28031

Subject: Solid Waste Permit No. 92-30  
Highway 55 C&D Landfill, LLC Construction and Demolition(C&D) Landfill  
Old Smithfield Road, Apex, Wake County, North Carolina.  
PERMIT TO OPERATE: MODIFICATION #1 - COMPOST AND  
REPROCESSING FACILITY (PHASE 3 AREA)

Dear Mr. Griffin:

The referenced PERMIT TO OPERATE is issued in accordance with N.C.G.S. 130A-294 and the N.C. Solid Waste Management Rules, 15A NCAC 13B, .0201(b)(1). Enclosed is attachment 1, which lists documents included in the Approved Plan. The approved facility description includes the area described in the attached legal description. Within the approved facility, the initial area identified as Phase I ( 5.80 acres of 17.80 acres) is permitted for operation as shown on Sheet C2 (master site grading plan) and Sheet C3 (Phase I grading plan), along with the LARGE TYPE 1 SOLID WASTE COMPOST AND REPROCESSING FACILITY located in the Phase 3 area of the site.

This permit is for the operation of the first five-year phase, Phase I ( 5.80 acres of 17.80 acres) is permitted for operation as shown on Sheet C3 (Phase I grading plan) dated 6 May 2002 of the approved plans. At the end of the first five-year operational period, Highway 55 C&D Landfill, LLC may apply for an expansion into and construction of Phase 2, but will be subject to all rules in effect at that time. This permit is issued to Griffin Brothers Companies d/b/a Highway 55 C&D Landfill, LLC as the owner and operator of the facility.

Please refer to the GENERAL CONDITIONS of this permit for recordation procedures, the definition of the approved plan, and for general terms of the Solid Waste Permit. The CONSTRUCTION AND OPERATION conditions describe permitted fill areas, acceptable waste types, landfill operation, and requirements which must be satisfied prior to operation of the facility as a Construction & Demolition landfill. Specific requirements for groundwater monitoring and facility record keeping and reporting are described in the MONITORING AND REPORTING conditions.

1646 Mail Service Center, Raleigh, North Carolina 27699-1646  
Phone: 919-733-0692 \ FAX: 919-733-4810 \ Internet: [www.enr.state.nc.us/](http://www.enr.state.nc.us/)

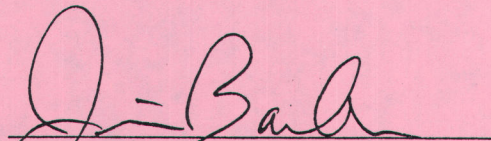
Mr. Griffin  
Page 2  
December 27, 2002

Please review the Conditions of Permit thoroughly, especially the following specific conditions:

- A. Monitoring and Reporting Requirement No. 12(e) requires that the groundwater quality monitoring wells must be installed and sampled prior to accepting waste at this landfill. Please consult with Mr. Bobby Lutfy, Solid Waste Section Project Hydrogeologist at (919) 733-0692, Ext. 258 just prior to well construction to help ensure that completed wells meet well construction standards and will be acceptable for monitoring purposes.

Again, please review the Conditions of Permit thoroughly and contact me if you have any questions or if you require further clarification. Mr. Robert Hearn is the Solid Waste Section Waste Management Specialist for this area and can be contacted at the DENR Raleigh Regional Office by phone at (919) 571-4700. Jim Barber can be contacted at the Raleigh Central Office at (919) 733-0692 Extension 255.

Respectfully,



Jim Barber  
Permitting Branch Supervisor  
Solid Waste Section

enclosure

cc: Mark Fry  
Robert Hearn  
Bobby Lutfy  
Dan Brewer  
Raleigh Central File: Wake County; 92-30 Permit File

PERMIT NO.: 92-30  
DATE ISSUED(PTC): 08/12/02  
DATE ISSUED(PTO): 12/10/02  
DATE MODIFIED(#1/PTO):12/27/02

STATE OF NORTH CAROLINA  
DEPARTMENT OF ENVIRONMENT AND NATURAL RESOURCES  
DIVISION OF WASTE MANAGEMENT  
1646 MAIL SERVICE CENTER; RALEIGH, NC 27699-1646

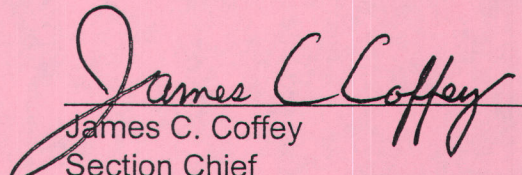
SOLID WASTE PERMIT

Griffin Brothers Companies  
d/b/a Highway 55 C&D Landfill, LLC

is hereby issued a PERMIT TO OPERATE a

Construction and Demolition Landfill unit, PHASE 1 (5.80 acres of a 17.8 acre cell)  
and  
Large, Type 1 Solid Waste Compost and Reprocessing Facility (phase 3 area)

located north of and accessed by Old Smithfield Road and west of Highway 55 By-pass and further described by Parcel Identification Number 0740.02-55-8687 in Apex, Wake County, North Carolina in accordance with Article 9, Chapter 130A, of the General Statutes of North Carolina and all rules promulgated thereunder and subject to the conditions set forth in this permit. The facility is located and described by the legal description of the site included with this permit and further identified on the deed recorded for this property in Book: 9099 and Page(s): 1039 - 1044 in the Wake County Register of Deeds for Highway 55 C&D Landfill, LLC.

  
James C. Coffey  
Section Chief  
Solid Waste Section  
Division of Waste Management

PERMIT NUMBER: 92-30  
DATE ISSUED(PTC): 08/12/02  
DATE ISSUED(PTO): 12/10/02  
DATE MODIFIED(#1/PTO): 12/27/02

SOLID WASTE PERMIT  
PERMIT TO OPERATE

Griffin Brothers Companies d/b/a Highway 55 C&D Landfill, LLC  
A Construction and Demolition Debris Landfill Unit - PHASE I

**CONDITIONS OF PERMIT:**

**GENERAL**

1. This PERMIT TO OPERATE will be in effect for five years from date of issuance (10 December 2002) of the permit to operate and will be reviewed in accordance with 15A NCAC 13B .0201 ( c ), under rules in effect at that time of review. Modifications to the facility may be required in accordance with rules in effect at the time of review. This permit shall not be effective unless the PERMIT TO CONSTRUCT along with the certified copy is filed in the Register of Deeds Office, in the grantor index under the name of the owner of the land in the county or counties in which the land is located. This PERMIT TO CONSTRUCT should be referenced and recorded against the deed recorded in Book: 9099 Pages: 1039 thru 1044. The certified copy shall be returned to the Solid Waste Section, within 30 days of receipt of the PERMIT TO CONSTRUCT, and shall have indicated on it the book number, page, date of recordation and the Register's seal. The PERMIT TO CONSTRUCT was recorded on 13 August 2002 at Book: 009539 and Pages: 00315 - 00335. When this property is sold, leased, transferred or conveyed, the deed or other instrument of transfer shall contain in the description section in no smaller type than that used in the body of the deed or instrument, a statement that the property has been used as a sanitary landfill.
2. The approved plan is described by Attachment 1, "List of Documents for Approved Plan". Where discrepancies may exist, the most recent submittal and the Conditions of Permit shall govern. Some components of the approved plan are reiterated in the Conditions of Permit.
3. This permit is not transferable.
4. The service area for this facility consists of the County of Wake and its municipalities. The disposal capacity for the facility (PHASE 1) is approximately 858,000 cubic yards(appendix 1 - landfill capacity and borrow soil calculations), consistent with the final contours as shown on SHEET C5 (phase I closure plan) in the construction application. This capacity is based the receipt of approximately 300,000 tons/year based on operating 6 days/week (approx. 312 days/ year), with a maximum variance in accordance with GS 130A-294(b1)(1) and consistent with the approved franchise granted by the County of Wake dated 3 December 2001.

## OPERATION:

5. This permit is for the operation of Griffin Brothers Companies d/b/a Highway 55 C&D Landfill, LLC Construction and Demolition(C&D) Landfill unit denoted as Phase 1 in accordance with the site plan SHEET C3, titled Phase I GRADING PLAN . At this time only 5.80 acres are approved for operation, consistent with the certification document dated 30 September 2002. Prior to placing waste in areas of Phase 1 not constructed at this time, consistent with the above mentioned drawing, certification that the remainder of Phase 1 has been constructed and graded in accordance with the approved plans will be required. Posts shall be installed at the north and south corners of the 5.80 acre constructed area, to delineate the eastern boundary, of the waste disposal limits consistent with the as-built drawing (dated 9/30/02) in the certification document dated 2 October 2002.
6. All sedimentation/erosion control activities will be conducted in accordance with the Sedimentation Control Act codified at 15 NCAC 4. Native vegetation shall be established on the completed C&D landfill unit in accordance with 15A NCAC 13B .0505 (3)(b)(c).
7. The following requirements shall be met prior to operation of the remaining 12 acres of PHASE 1 (i.e. Prior to the re-issuance of the original PERMIT TO OPERATE):
  - a. Phase 1 (remaining 12 acres) preparation shall be in accordance with the construction plan, SHEET C3, and the conditions specified herein; and construction of PHASE 1 shall be certified by the design engineer to be constructed in accordance with the approved plans.
  - b. Phase 1 unit inspection shall be made by a representative of the Division of Waste Management (DWM) with the owner/operator.
  - c. Signs shall be posted at the entrance of Highway 55 C&D Landfill, LLC landfill, in accordance with the Access and Safety Requirements under Operation Condition .0505(8).
  - d. Groundwater monitoring wells (see Monitoring and Reporting Requirements) shall be installed consistent with condition 14(a) thru (g). A baseline sampling for water quality shall be performed. Well construction records, soil boring logs and sample analysis results shall be submitted to the Section Hydrogeologist for review and approval prior to operation of the C&D unit. Additional interim ground water monitoring well(s) shall be installed to the south and east of the PHASE 1 footprint, within the review boundary for PHASE 1, at the design hydrogeologist recommended locations. A proposed location plan for the additional well(s) shall be submitted to the Solid Waste Section for review and concurrence.
  - e. Inspection and certification of the PHASE 1 subgrade (remaining 12 acres), by the project hydrogeologist, to determine if subgrade conditions are consistent with the observations made during the initial site investigations and information provided in the site hydrogeology report. If conditions found are different than conditions stated in the hydrogeologic report or that would impact or have an effect on the proposed ground water monitoring system; then a revised ground watering monitoring plan will be required.
  - f. No blasting shall take place on the site unless a pre-blast survey is performed and a blasting plan is submitted to the Solid Waste Section for review and concurrence.
  - g. All well construction records and soil boring logs( for existing and new wells), along with sample analysis results shall be submitted to the Section Hydrogeologist for review and approval prior to operation of the C&D unit.

8. This C&D unit (PHASE 1) is permitted to receive the following waste types:
- a. Land-clearing debris as defined in G.S. 130A-290, specifically, solid waste which is generated solely from land-clearing activities, such as stumps, trees;
  - b. Inert debris defined as solid waste which consists solely of material that is virtually inert, such as brick, concrete, rock and clean soil; and
  - c. Asphalt in accordance with G.S. 130-294(m).
  - d. Construction and demolition debris defined as solid waste resulting solely from construction, remodeling, repair or demolition operations on pavement, buildings, or other structures.

Yard trash as defined in G.S. 130A-290, shall not be disposed in the landfill area. However, yard trash, along with land-clearing debris, may be accepted for processing in the Yard Waste Composting Area or disposed of in a LCID landfill.

9. Operation of the C&D landfill unit shall conform to the operating procedures described in the approved plan, in accordance with Section .0505 of the Solid Waste Management Rules, and in accordance with the following requirements: Waste Acceptance and Disposal.
- a. The C&D unit shall accept only those solid wastes which it is permitted to receive as outlined in condition 8.
  - b. No municipal solid waste, hazardous waste, or liquid waste shall be accepted for disposal in the C&D unit.
  - c. The permittee shall implement a program for the C&D unit for detecting and preventing the disposal of MSW, hazardous or liquid wastes. The program shall include, at a minimum:
    - (i) Random inspections of incoming loads or other comparable procedures;
    - (ii) Records of any inspections;
    - (iii) Training of personnel to recognize hazardous and liquid wastes;
    - (iv) Development of a contingency plan to properly manage any identified hazardous, liquid or MSW wastes; The plan must address identification, removal, storage, and final disposition of waste.

#### Cover Material Requirements

- d. Operational soil cover of at least six inches shall be placed at least once per week or when the active area reaches  $\frac{1}{2}$  acre in size, or more often as necessitated by the nature of the waste, as to prevent the site from becoming a visual nuisance and to prevent fire, windblown materials, vectors, or excessive water infiltration.

- e. Areas which will not have additional waste placed on them for 12 months or more, but where final termination of operations has not occurred, shall be covered with a minimum of one foot of soil cover [15A NCAC 13B .0505(3)(b)].
- f. After final termination of disposal operations at the C&D unit or major part thereof, or upon revocation of a permit, the fill areas shall be covered with at least two feet of suitable compacted earth [15A NCAC 13B .0505(3)(c)] or a cap as specified by the rules in effect at the time of closure.

#### Access and Safety

- g. The C&D unit shall be adequately secured by means of gates, chains, berms, fences, or other security measures approved by the DWM to prevent unauthorized entry.
- h. An attendant shall be on duty at the Highway 55 C&D Landfill, LLC landfill at all times while it is open for public use to ensure compliance with operational requirements.
- i. The access road from Old Smithfield Road to the C&D unit shall be of all-weather construction and maintained in good condition.
- j. Dust control measures shall be implemented when necessary.
- k. Signs providing information on dumping procedures, the hours of operation, the permit number, and other pertinent information shall be posted at the entrance to the Highway 55 C&D Landfill, LLC landfill.
- l. Signs shall be posted stating that no MSW, hazardous waste or liquid waste can be received in the C&D unit.
- m. Traffic signs or markers shall be provided as necessary to promote an orderly traffic pattern to and from the discharge area and to maintain efficient operating conditions.
- n. The removal of solid waste from the facility is prohibited unless the owner/operator approves and the removal is not performed on the working face. If C&D recycling is to take place in the future; amendment of the operations plan shall be submitted to the Solid Waste Section for approval.
- o. Barrels and drums shall not be disposed of unless they are empty and perforated sufficiently to ensure that no liquid or hazardous waste is contained therein, except fiber drums containing asbestos. Asbestos waste shall be managed in accordance with 40 CFR 61.
- p. Open burning of solid waste is prohibited. Fires shall be reported to the Solid Waste Section by phone within 24 hours of an incident and written notification shall be submitted within 14 working days addressing the events at the site and future actions to be taken in the future to avoid and or mitigate potential fire hazards.
- q. The concentration of explosive gases generated by the C&D unit shall not exceed:

- i. twenty-five percent of the lower explosive limit(1.25% of CH<sub>4</sub>) for gases in site structures (excluding gas control or recovery system components if necessary; and
- ii. One hundred percent of the lower explosive limit(5% CH<sub>4</sub>) for gases at the property boundary. Installation of permanent gas monitoring wells may be required in the future to demonstrate compliance.

#### Erosion and Sedimentation Control

- r. Adequate sedimentation and erosion control measures shall be practiced to prevent silt from leaving the site of the C&D unit.
- s. Adequate sedimentation and erosion control measures shall be practiced to prevent excessive on-site erosion.
- t. Provisions for a vegetative ground cover sufficient to restrain erosion must be accomplished within 30 working days or 120 calendar days upon completion of any phase of C&D landfill unit development or as addressed in the approved Sedimentation and Erosion Control permit.

#### Drainage Control and Water Protection Requirements

- u. Surface water shall be diverted from the operational area.
  - v. Surface water shall not be impounded over or in waste.
  - w. A separation distance of at least four feet shall be maintained between the C&D waste and the groundwater table; as addressed in the site suitability application, hydrologic assessment section.
  - x. Solid waste(C&D) shall not be disposed of in water.
  - y. Leachate shall be contained on site or properly treated prior to discharge. An NPDES permit may be required prior to discharge of leachate to surface waters and or for land disturbing activities greater than one acre.
10. All pertinent landfill operating personnel will receive training and supervision necessary to properly operate this C&D landfill unit in accordance with G.S. 130A-309.25 and addressed by memorandum dated 29 November 2000 (enclosed).
  11. Ground water quality for the C&D landfill unit is subject to the classification and remedial action provisions referenced in Rule .0503 (2)(d) of 15A NCAC 13B.
  12. A closure and post-closure plan must be submitted for approval at least 90 days prior to closure or partial closure of any landfill unit. The plan must include all steps and measures necessary to close and maintain the C&D unit in accordance with all rules in effect at that time. At a minimum, the plan shall address the following:
    - a. Design of a final cover system as required by the solid waste management rules in effect at the time of closure;

- b. Construction and maintenance/operation of the final cover system and erosion control structures;
- c. Surface water, ground water, and explosive gas monitoring.

## MONITORING AND REPORTING REQUIREMENTS

- 13. Ground-water monitoring wells and monitoring requirements for the C&D landfill unit:
  - a. Monitoring well design and construction shall conform to the specifications outlined in, "North Carolina Water Quality Monitoring Guidance Document for Solid Waste Facilities-DRAFT" and water quality sampling and analysis shall be done in accordance with Construction and Demolition landfills and Closed Sanitary Landfills
  - b. A total of seven locations for ground water wells ( MW-1 upgradient and MW-2, MW-3, MW-4, MW-5, MW-6 and MW-7 downgradient locations for Phase I) and four surface water locations (SW-1, SW-2, SW-3 and SW-4) [in accordance with the Groundwater Monitoring Plan, as part of the Site Suitability Plan dated 19 April 2002 by Enviro-Pro, P.C.].
  - c. A geologist shall be in the field to supervise well installation. The exact locations, screened intervals, and nesting of the wells shall be established after consultation with the SWS Hydrogeologist at the time of well installation.
  - d. For each monitoring well constructed, a well completion record shall be submitted to DWM within 30 days upon completion.
  - e. Prior to the acceptance of any waste at the C&D unit, a baseline sampling event shall be completed and analysis submitted to the SWS Hydrogeologist.
  - f. Sampling equipment, procedures, and parameters shall conform to specifications outlined in the above-referenced guidance document,[Monitoring and Reporting Requirements, condition 13(a) pg. 9] or the current guidelines established by DWM at the time of sampling.
  - g. In order to determine ground-water flow directions and rates, each monitoring well shall be surveyed, and hydraulic conductivity values and effective porosity values shall be established for the screened intervals for each monitoring well.
  - h. The permittee shall sample the monitoring wells semi-annually or as directed by the SWS Hydrogeologist. In addition to the wells described in condition 14(b); surface water locations SW-1, SW-2, SW-3 and SW-4 shall also be sampled semi-annually as part of the monitoring system.
  - i. A readily accessible unobstructed path shall be initially cleared and maintained so that four-wheel drive vehicles may access the monitoring wells at all times.

14. The permittee shall maintain a record of all monitoring events and analytical data. Reports of the analytical data for each water quality monitoring sampling event shall be submitted to DWM in a timely manner.
15. The permittee shall maintain a record of the amount of solid waste received at the C&D unit, compiled on a monthly basis. Scales shall be used to weigh the amount of waste received.
16. On or before 01 August 2003, and each year thereafter, the permittee shall report the amount of waste received (in tons) at the C&D unit and disposed of in the C&D landfill unit to the Solid Waste Section and to all counties from which waste was accepted, on forms prescribed by the Section. This report shall include the following information:
  - a. The reporting period shall be for the previous year, beginning 01 July and ending on 30 June;
  - b. The amount of waste received and landfilled in tons, compiled on a monthly basis, and;
  - c. Documentation that a copy of the report has been forwarded to all counties from which waste was accepted.
17. All records shall be maintained on-site and made available to the SWS upon request, specifically records generated by conditions 9, 10, 12, 13, 14, 15 & 16.

Conditions for a LARGE, TYPE 1 SOLID WASTE COMPOST AND REPROCESSING FACILITY

18. Operation and maintenance of this facility shall be in accordance with the Solid Waste Compost Rules (15A NCAC 13B, Section .1400), the permit application and the Operation and Maintenance Manual, dated 17 December 2002 and signed by the design engineer on 18 December 2002, submitted with the permit application. Failure to comply may result in compliance actions or permit revocation.
19. This facility shall be operated in such a manner that erosion and runoff from the site shall be controlled. Any leachate generated at the facility shall be managed in such a manner that it will not be allowed to adversely impact ground or surface waters. Groundwater monitoring wells may be required if there is indication of the potential for groundwater contamination.
20. A storm water permit for the facility shall be maintained as long as the facility is in operation.
21. Only materials specifically listed in the permit application may be managed at this facility without adequate testing and prior approval of the Division of Waste Management.

22. Wastes with low carbon-nitrogen ratios, such as grass clippings, shall be incorporated into the windrows prior to the waste starting to compost (heat), create odors or attract vectors.
23. Temperatures of compost windrows shall be monitored at a frequency adequate to assure that the temperature requirements of Rule .1406(10) are met. If wood chip windrows generate temperatures in excess of 115 degrees F they should be treated as compost.
24. Facility operation records shall be maintained in accordance with Rule .1408(b).
25. An annual report of facility activities for the fiscal year July 1 to June 30 shall be submitted to the Division of Waste Management, Solid Waste Section, by August 1 of each year, in accordance with Rule .1408(c) of the Solid Waste Compost Rules.
26. The facility shall be operated and maintained with sufficient dust control measures to minimize airborne emissions and to prevent dust from becoming a nuisance or safety hazard.
27. This permit shall expire on 27 December 2007. A properly completed application for permit renewal, consistent with .0201(e), shall be submitted at least ninety (90) days prior to the permit expiration date in order to assure continued operation.
28. Changes in ownership or receiving additional types of wastes shall require a permit modification.

ATTACHMENTS  
GRIFFIN BROTHERS COMPANIES d/b/a HIGHWAY 55 C&D LANDFILL, LLC  
List of Documents for the Approved Plan

SITE SUITABILITY:

1. Report - Site Application - Highway 55 C&D Landfill and Recycling Center - prepared for Highway 55 C&D Landfill, LLC Construction & Demolition Landfill - Wake County, North Carolina; application dated 19 April 2002 and received 24 April 2002 from Enviro-Pro, P.C.;
2. Response to Comment dated 19 March 2002 - Site Suitability Permit Application, response received 24 April 2002 and 8 May 2002 from Enviro-Pro for information dated 19 April 2002 and 7 May 2002;
3. Second Response to Comment letter dated 3 July 2002 - Site Suitability Permit Application - response dated 11 July 2002 "Revised Site Plan Application Report" from Enviro-Pro;
4. Certified minutes from Wake County dated 3 December 2001 and 19 November 2001 indicating the vote of the Wake County Commissioners in approving the franchise for Highway 55 C&D Landfill, LLC, received in the Revised Site Suitability application dated April 2002 received 24 April 2002;
5. Special Use Permit recorded in Deed Book: 9099 and Pages: 1039 thru 1044, as part of the Site Suitability application dated April 2002 received 24 April 2002;

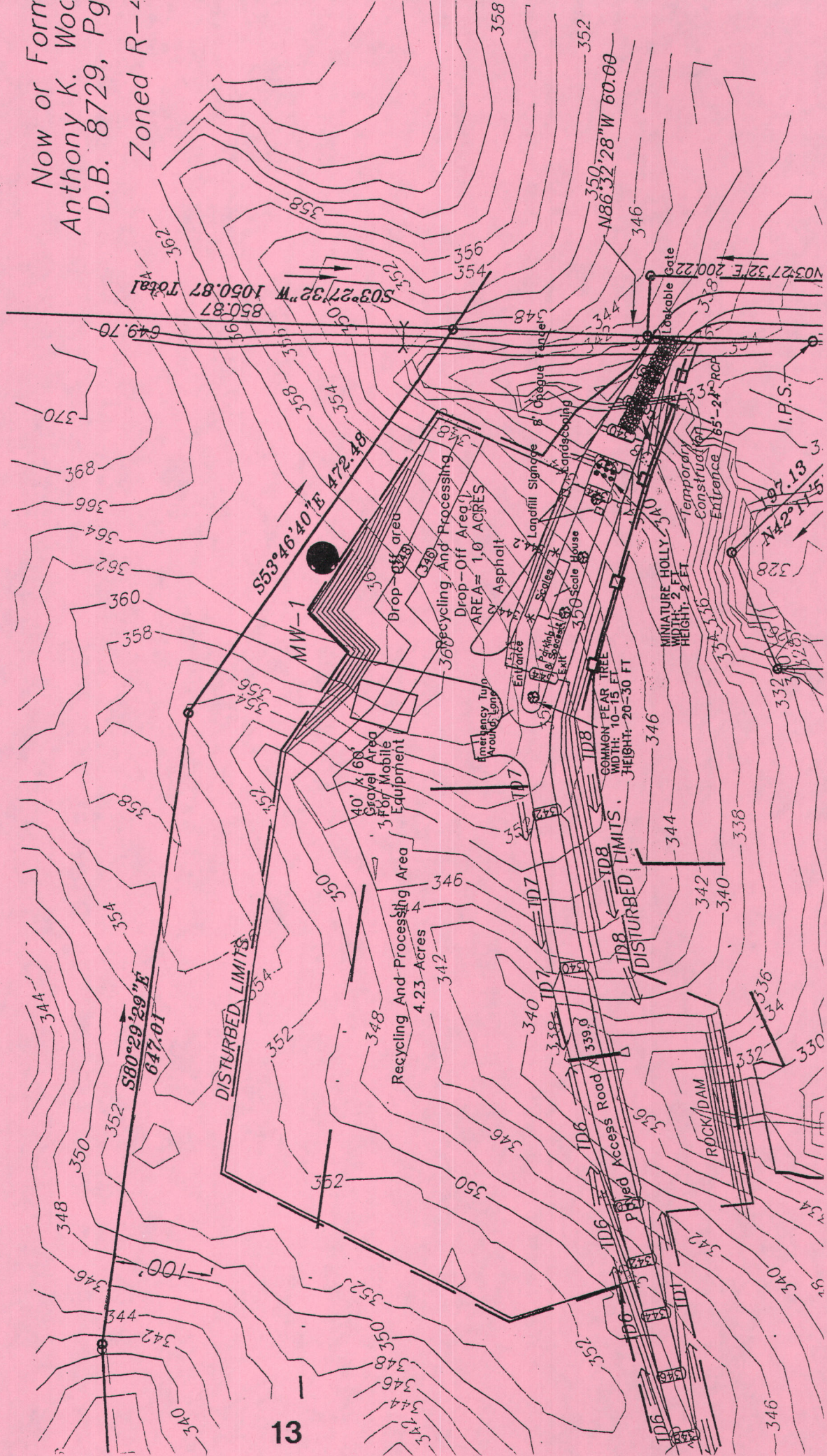
CONSTRUCTION:

6. Deed description for re-combination of properties consisting of Book: 9099 and Pages: 1039 - 1044 representing 116.333 acres and Book: 9488 and Pages: 0922 - 0923 representing .963 acres.
7. Construction certification report dated 2 October 2002 for the operation of 5.80 acres of 17.80 acres, of Phase 1.

OPERATION:

8. Initial sampling report of monitoring system dated 18 October 2002.
9. Recorded permit to construct dated 13 August 2002 in Book: 9539 and Pages: 00315 to 00335.
10. Reprocessing facility application dated 17 December 2002, signed by design engineer on 18 December 2002, received by the Solid Waste Section on 19 December 2002.

Now or Form  
Anthony K. Wood  
D.B. 8729, Pg  
Zoned R-4



North Carolina  
Department of Environment and Natural Resources

Division of Waste Management

Michael F. Easley, Governor  
William G. Ross Jr., Secretary  
Dexter R. Matthews, Director



December 10, 2002

Mr. Mike L. Griffin  
Griffin Brothers Companies  
d/b/a Highway 55 C&D Landfill, LLC  
19109 W. Catawba Ave.; Suite 118  
Cornelius, North Carolina 28031

Subject: Solid Waste Permit No. 92-30  
Highway 55 C&D Landfill, LLC Construction and Demolition(C&D) Landfill  
Old Smithfield Road, Apex, Wake County, North Carolina.  
PERMIT TO OPERATE

Dear Mr. Griffin:

The referenced PERMIT TO OPERATE is issued in accordance with N.C.G.S. 130A-294 and the N.C. Solid Waste Management Rules, 15A NCAC 13B, .0201(b)(1). Enclosed is attachment 1, which lists documents included in the Approved Plan. The approved facility description includes the area described in the attached legal description. Within the approved facility, the initial area identified as Phase I ( 5.80 acres of 17.80 acres) is permitted for operation as shown on Sheet C2 (master site grading plan) and Sheet C3 (Phase I grading plan).

This permit is for the operation of the first five-year phase, Phase I ( 5.80 acres of 17.80 acres) is permitted for operation as shown on Sheet C3 (Phase I grading plan) dated 6 May 2002 of the approved plans. At the end of the first five-year operational period, Highway 55 C&D Landfill, LLC may apply for an expansion into and construction of Phase 2, but will be subject to all rules in effect at that time. This permit is issued to Griffin Brothers Companies d/b/a Highway 55 C&D Landfill, LLC as the owner and operator of the facility.

Please refer to the GENERAL CONDITIONS of this permit for recordation procedures, the definition of the approved plan, and for general terms of the Solid Waste Permit. The CONSTRUCTION AND OPERATION conditions describe permitted fill areas, acceptable waste types, landfill operation, and requirements which must be satisfied prior to operation of the facility as a Construction & Demolition landfill. Specific requirements for groundwater monitoring and facility record keeping and reporting are described in the MONITORING AND REPORTING conditions.

1646 Mail Service Center, Raleigh, North Carolina 27699-1646  
Phone: 919-733-0692 \ FAX: 919-733-4810 \ Internet: [www.enr.state.nc.us/](http://www.enr.state.nc.us/)

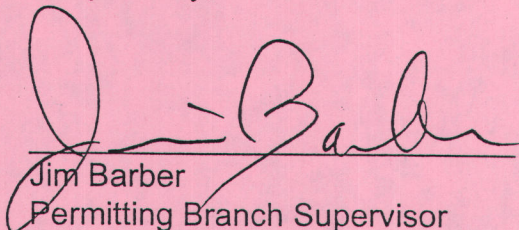
Mr. Griffin  
Page 2  
December 10, 2002

Please review the Conditions of Permit thoroughly, especially the following specific conditions:

- A. Monitoring and Reporting Requirement No. 12(e) requires that the groundwater quality monitoring wells must be installed and sampled prior to accepting waste at this landfill. Please consult with Mr. Bobby Lutfy, Solid Waste Section Project Hydrogeologist at (919) 733-0692, Ext. 258 just prior to well construction to help ensure that completed wells meet well construction standards and will be acceptable for monitoring purposes.

Again, please review the Conditions of Permit thoroughly and contact me if you have any questions or if you require further clarification. Mr. Robert Hearn is the Solid Waste Section Waste Management Specialist for this area and can be contacted at the DENR Raleigh Regional Office by phone at (919) 571-4700. Jim Barber can be contacted at the Raleigh Central Office at (919) 733-0692 Extension 255.

Respectfully,



Jim Barber  
Permitting Branch Supervisor  
Solid Waste Section

enclosure

cc: Mark Fry  
Robert Hearn  
Bobby Lutfy  
Dan Brewer  
✓ Raleigh Central File: Wake County; 92-30 Permit File

PERMIT NO.: 92-30  
DATE ISSUED(PTC): 08/12/02  
DATE ISSUED(PTO): 12/10/02

STATE OF NORTH CAROLINA  
DEPARTMENT OF ENVIRONMENT AND NATURAL RESOURCES  
DIVISION OF WASTE MANAGEMENT  
1646 MAIL SERVICE CENTER; RALEIGH, NC 27699-1646

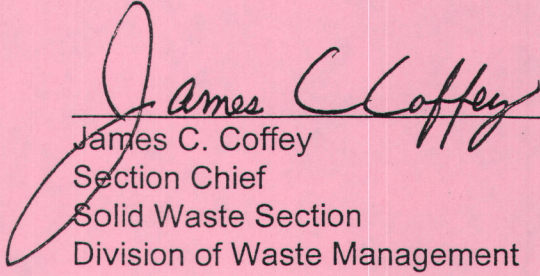
SOLID WASTE PERMIT

Griffin Brothers Companies  
d/b/a Highway 55 C&D Landfill, LLC

is hereby issued a PERMIT TO OPERATE a

Construction and Demolition Landfill unit, PHASE 1 (5.80 acres of a 17.8 acre cell)

located north of and accessed by Old Smithfield Road and west of Highway 55 By-pass and further described by Parcel Identification Number 0740.02-55-8687 in Apex, Wake County, North Carolina in accordance with Article 9, Chapter 130A, of the General Statutes of North Carolina and all rules promulgated thereunder and subject to the conditions set forth in this permit. The facility is located and described by the legal description of the site included with this permit and further identified on the deed recorded for this property in Book: 9099 and Page(s): 1039 - 1044 in the Wake County Register of Deeds for Highway 55 C&D Landfill, LLC.

  
James C. Coffey

Section Chief

Solid Waste Section

Division of Waste Management

PERMIT NUMBER: 92-30  
DATE ISSUED(PTC): 08/12/02  
DATE ISSUED(PTO): 12/10/02

SOLID WASTE PERMIT  
PERMIT TO OPERATE

Griffin Brothers Companies d/b/a Highway 55 C&D Landfill, LLC  
A Construction and Demolition Debris Landfill Unit - PHASE I

**CONDITIONS OF PERMIT:**

**GENERAL**

1. This PERMIT TO OPERATE will be in effect for five years from date of issuance (10 December 2002) of the permit to operate and will be reviewed in accordance with 15A NCAC 13B .0201 ( c ), under rules in effect at that time of review. Modifications to the facility may be required in accordance with rules in effect at the time of review. This permit shall not be effective unless the PERMIT TO CONSTRUCT along with the certified copy is filed in the Register of Deeds Office, in the grantor index under the name of the owner of the land in the county or counties in which the land is located. This PERMIT TO CONSTRUCT should be referenced and recorded against the deed recorded in Book: 9099 Pages: 1039 thru 1044. The certified copy shall be returned to the Solid Waste Section, within 30 days of receipt of the PERMIT TO CONSTRUCT, and shall have indicated on it the book number, page, date of recordation and the Register's seal. The PERMIT TO CONSTRUCT was recorded on 13 August 2002 at Book: 009539 and Pages: 00315 - 00335. When this property is sold, leased, transferred or conveyed, the deed or other instrument of transfer shall contain in the description section in no smaller type than that used in the body of the deed or instrument, a statement that the property has been used as a sanitary landfill.
2. The approved plan is described by Attachment 1, "List of Documents for Approved Plan". Where discrepancies may exist, the most recent submittal and the Conditions of Permit shall govern. Some components of the approved plan are reiterated in the Conditions of Permit.
3. This permit is not transferable.
4. The service area for this facility consists of the County of Wake and its municipalities. The disposal capacity for the facility (PHASE 1) is approximately 858,000 cubic yards(appendix 1 - landfill capacity and borrow soil calculations), consistent with the final contours as shown on SHEET C5 (phase I closure plan) in the construction application. This capacity is based the receipt of approximately 300,000 tons/year based on operating 6 days/week (approx. 312 days/ year), with a maximum variance in accordance with GS 130A-294(b1)(1) and consistent with the approved franchise granted by the County of Wake dated 3 December 2001.

## OPERATION:

5. This permit is for the operation of Griffin Brothers Companies d/b/a Highway 55 C&D Landfill, LLC Construction and Demolition(C&D) Landfill unit denoted as Phase 1 in accordance with the site plan SHEET C3, titled Phase I GRADING PLAN . At this time only 5.80 acres are approved for operation, consistent with the certification document dated 30 September 2002. Prior to placing waste in areas of Phase 1 not constructed at this time, consistent with the above mentioned drawing, certification that the remainder of Phase 1 has been constructed and graded in accordance with the approved plans will be required. Posts shall be installed at the north and south corners of the 5.80 acre constructed area, to delineate the eastern boundary, of the waste disposal limits consistent with the as-built drawing (dated 9/30/02) in the certification document dated 2 October 2002.
6. All sedimentation/erosion control activities will be conducted in accordance with the Sedimentation Control Act codified at 15 NCAC 4. Native vegetation shall be established on the completed C&D landfill unit in accordance with 15A NCAC 13B .0505 (3)(b)(c).
7. The following requirements shall be met prior to operation of the remaining 12 acres of PHASE 1 (i.e. Prior to the re-issuance of the original PERMIT TO OPERATE):
  - a. Phase 1 (remaining 12 acres) preparation shall be in accordance with the construction plan, SHEET C3, and the conditions specified herein; and construction of PHASE 1 shall be certified by the design engineer to be constructed in accordance with the approved plans.
  - b. Phase 1 unit inspection shall be made by a representative of the Division of Waste Management (DWM) with the owner/operator.
  - c. Signs shall be posted at the entrance of Highway 55 C&D Landfill, LLC landfill, in accordance with the Access and Safety Requirements under Operation Condition .0505(8).
  - d. Groundwater monitoring wells (see Monitoring and Reporting Requirements) shall be installed consistent with condition 14(a) thru (g). A baseline sampling for water quality shall be performed. Well construction records, soil boring logs and sample analysis results shall be submitted to the Section Hydrogeologist for review and approval prior to operation of the C&D unit. Additional interim ground water monitoring well(s) shall be installed to the south and east of the PHASE 1 footprint, within the review boundary for PHASE 1, at the design hydrogeologist recommended locations. A proposed location plan for the additional well(s) shall be submitted to the Solid Waste Section for review and concurrence.
  - e. Inspection and certification of the PHASE 1 subgrade (remaining 12 acres), by the project hydrogeologist, to determine if subgrade conditions are consistent with the observations made during the initial site investigations and information provided in the site hydrogeology report. If conditions found are different than conditions stated in the hydrogeologic report or that would impact or have an effect on the proposed ground water monitoring system; then a revised ground watering monitoring plan will be required.
  - f. No blasting shall take place on the site unless a pre-blast survey is performed and a blasting plan is submitted to the Solid Waste Section for review and concurrence.
  - g. All well construction records and soil boring logs( for existing and new wells), along with sample analysis results shall be submitted to the Section Hydrogeologist for review and approval prior to operation of the C&D unit.

8. This C&D unit (PHASE 1) is permitted to receive the following waste types:
- Land-clearing debris as defined in G.S. 130A-290, specifically, solid waste which is generated solely from land-clearing activities, such as stumps, trees;
  - Inert debris defined as solid waste which consists solely of material that is virtually inert, such as brick, concrete, rock and clean soil; and
  - Asphalt in accordance with G.S. 130-294(m).
  - Construction and demolition debris defined as solid waste resulting solely from construction, remodeling, repair or demolition operations on pavement, buildings, or other structures.

Yard trash as defined in G.S. 130A-290, shall not be disposed in the landfill area. However, yard trash, along with land-clearing debris, may be accepted for processing in the Yard Waste Composting Area or disposed of in a LCID landfill.

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- The C&D unit shall accept only those solid wastes which it is permitted to receive as outlined in condition 8.
  - No municipal solid waste, hazardous waste, or liquid waste shall be accepted for disposal in the C&D unit.
  - The permittee shall implement a program for the C&D unit for detecting and preventing the disposal of MSW, hazardous or liquid wastes. The program shall include, at a minimum:
    - Random inspections of incoming loads or other comparable procedures;
    - Records of any inspections;
    - Training of personnel to recognize hazardous and liquid wastes;
    - Development of a contingency plan to properly manage any identified hazardous, liquid or MSW wastes; The plan must address identification, removal, storage, and final disposition of waste.

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- Operational soil cover of at least six inches shall be placed at least once per week or when the active area reaches  $\frac{1}{2}$  acre in size, or more often as necessitated by the nature of the waste, as to prevent the site from becoming a visual nuisance and to prevent fire, windblown materials, vectors, or excessive water infiltration.

- e. Areas which will not have additional waste placed on them for 12 months or more, but where final termination of operations has not occurred, shall be covered with a minimum of one foot of soil cover [15A NCAC 13B .0505(3)(b)].
- f. After final termination of disposal operations at the C&D unit or major part thereof, or upon revocation of a permit, the fill areas shall be covered with at least two feet of suitable compacted earth [15A NCAC 13B .0505(3)(c)] or a cap as specified by the rules in effect at the time of closure.

#### Access and Safety

- g. The C&D unit shall be adequately secured by means of gates, chains, berms, fences, or other security measures approved by the DWM to prevent unauthorized entry.
- h. An attendant shall be on duty at the Highway 55 C&D Landfill, LLC landfill at all times while it is open for public use to ensure compliance with operational requirements.
- i. The access road from Old Smithfield Road to the C&D unit shall be of all-weather construction and maintained in good condition.
- j. Dust control measures shall be implemented when necessary.
- k. Signs providing information on dumping procedures, the hours of operation, the permit number, and other pertinent information shall be posted at the entrance to the Highway 55 C&D Landfill, LLC landfill.
- l. Signs shall be posted stating that no MSW, hazardous waste or liquid waste can be received in the C&D unit.
- m. Traffic signs or markers shall be provided as necessary to promote an orderly traffic pattern to and from the discharge area and to maintain efficient operating conditions.
- n. The removal of solid waste from the facility is prohibited unless the owner/operator approves and the removal is not performed on the working face. If C&D recycling is to take place in the future; amendment of the operations plan shall be submitted to the Solid Waste Section for approval.
- o. Barrels and drums shall not be disposed of unless they are empty and perforated sufficiently to ensure that no liquid or hazardous waste is contained therein, except fiber drums containing asbestos. Asbestos waste shall be managed in accordance with 40 CFR 61.
- p. Open burning of solid waste is prohibited. Fires shall be reported to the Solid Waste Section by phone within 24 hours of an incident and written notification shall be submitted within 14 working days addressing the events at the site and future actions to be taken in the future to avoid and or mitigate potential fire hazards.
- q. The concentration of explosive gases generated by the C&D unit shall not exceed:

- i. twenty-five percent of the lower explosive limit(1.25% of CH<sub>4</sub>) for gases in site structures (excluding gas control or recovery system components if necessary; and
- ii. One hundred percent of the lower explosive limit(5% CH<sub>4</sub>) for gases at the property boundary. Installation of permanent gas monitoring wells may be required in the future to demonstrate compliance.

#### Erosion and Sedimentation Control

- r. Adequate sedimentation and erosion control measures shall be practiced to prevent silt from leaving the site of the C&D unit.
- s. Adequate sedimentation and erosion control measures shall be practiced to prevent excessive on-site erosion.
- t. Provisions for a vegetative ground cover sufficient to restrain erosion must be accomplished within 30 working days or 120 calendar days upon completion of any phase of C&D landfill unit development or as addressed in the approved Sedimentation and Erosion Control permit.

#### Drainage Control and Water Protection Requirements

- u. Surface water shall be diverted from the operational area.
  - v. Surface water shall not be impounded over or in waste.
  - w. A separation distance of at least four feet shall be maintained between the C&D waste and the groundwater table; as addressed in the site suitability application, hydrologic assessment section.
  - x. Solid waste(C&D) shall not be disposed of in water.
  - y. Leachate shall be contained on site or properly treated prior to discharge. An NPDES permit may be required prior to discharge of leachate to surface waters and or for land disturbing activities greater than one acre.
- 10. All pertinent landfill operating personnel will receive training and supervision necessary to properly operate this C&D landfill unit in accordance with G.S. 130A-309.25 and addressed by memorandum dated 29 November 2000 (enclosed).
  - 11. Ground water quality for the C&D landfill unit is subject to the classification and remedial action provisions referenced in Rule .0503 (2)(d) of 15A NCAC 13B.
  - 12. A closure and post-closure plan must be submitted for approval at least 90 days prior to closure or partial closure of any landfill unit. The plan must include all steps and measures necessary to close and maintain the C&D unit in accordance with all rules in effect at that time. At a minimum, the plan shall address the following:
    - a. Design of a final cover system as required by the solid waste management rules in effect at the time of closure;

- b. Construction and maintenance/operation of the final cover system and erosion control structures;
- c. Surface water, ground water, and explosive gas monitoring.

## MONITORING AND REPORTING REQUIREMENTS

13. Ground-water monitoring wells and monitoring requirements for the C&D landfill unit:
- a. Monitoring well design and construction shall conform to the specifications outlined in, "North Carolina Water Quality Monitoring Guidance Document for Solid Waste Facilities-DRAFT" and water quality sampling and analysis shall be done in accordance with Construction and Demolition landfills and Closed Sanitary Landfills
  - b. A total of seven locations for ground water wells ( MW-1 upgradient and MW-2, MW-3, MW-4, MW-5, MW-6 and MW-7 downgradient locations for Phase I) and four surface water locations (SW-1, SW-2, SW-3 and SW-4) [in accordance with the Groundwater Monitoring Plan, as part of the Site Suitability Plan dated 19 April 2002 by Enviro-Pro, P.C.].
  - c. A geologist shall be in the field to supervise well installation. The exact locations, screened intervals, and nesting of the wells shall be established after consultation with the SWS Hydrogeologist at the time of well installation.
  - d. For each monitoring well constructed, a well completion record shall be submitted to DWM within 30 days upon completion.
  - e. Prior to the acceptance of any waste at the C&D unit, a baseline sampling event shall be completed and analysis submitted to the SWS Hydrogeologist.
  - f. Sampling equipment, procedures, and parameters shall conform to specifications outlined in the above-referenced guidance document, [Monitoring and Reporting Requirements, condition 13(a) pg. 9] or the current guidelines established by DWM at the time of sampling.
  - g. In order to determine ground-water flow directions and rates, each monitoring well shall be surveyed, and hydraulic conductivity values and effective porosity values shall be established for the screened intervals for each monitoring well.
  - h. The permittee shall sample the monitoring wells semi-annually or as directed by the SWS Hydrogeologist. In addition to the wells described in condition 14(b); surface water locations SW-1, SW-2, SW-3 and SW-4 shall also be sampled semi-annually as part of the monitoring system.
  - i. A readily accessible unobstructed path shall be initially cleared and maintained so that four-wheel drive vehicles may access the monitoring wells at all times.

14. The permittee shall maintain a record of all monitoring events and analytical data. Reports of the analytical data for each water quality monitoring sampling event shall be submitted to DWM in a timely manner.
15. The permittee shall maintain a record of the amount of solid waste received at the C&D unit, compiled on a monthly basis. Scales shall be used to weigh the amount of waste received.
16. On or before 01 August 2003, and each year thereafter, the permittee shall report the amount of waste received (in tons) at the C&D unit and disposed of in the C&D landfill unit to the Solid Waste Section and to all counties from which waste was accepted, on forms prescribed by the Section. This report shall include the following information:
  - a. The reporting period shall be for the previous year, beginning 01 July and ending on 30 June;
  - b. The amount of waste received and landfilled in tons, compiled on a monthly basis, and;
  - c. Documentation that a copy of the report has been forwarded to all counties from which waste was accepted.
17. All records shall be maintained on-site and made available to the SWS upon request, specifically records generated by conditions 9, 10, 12, 13, 14, 15 & 16.

ATTACHMENTS  
GRIFFIN BROTHERS COMPANIES d/b/a HIGHWAY 55 C&D LANDFILL, LLC  
List of Documents for the Approved Plan

SITE SUITABILITY:

1. Report - Site Application - Highway 55 C&D Landfill and Recycling Center - prepared for Highway 55 C&D Landfill, LLC Construction & Demolition Landfill - Wake County, North Carolina; application dated 19 April 2002 and received 24 April 2002 from Enviro-Pro, P.C.;
2. Response to Comment dated 19 March 2002 - Site Suitability Permit Application, response received 24 April 2002 and 8 May 2002 from Enviro-Pro for information dated 19 April 2002 and 7 May 2002;
3. Second Response to Comment letter dated 3 July 2002 - Site Suitability Permit Application - response dated 11 July 2002 "Revised Site Plan Application Report" from Enviro-Pro;
4. Certified minutes from Wake County dated 3 December 2001 and 19 November 2001 indicating the vote of the Wake County Commissioners in approving the franchise for Highway 55 C&D Landfill, LLC, received in the Revised Site Suitability application dated April 2002 received 24 April 2002;
5. Special Use Permit recorded in Deed Book: 9099 and Pages: 1039 thru 1044, as part of the Site Suitability application dated April 2002 received 24 April 2002;

CONSTRUCTION:

6. Deed description for re-combination of properties consisting of Book: 9099 and Pages: 1039 - 1044 representing 116.333 acres and Book: 9488 and Pages: 0922 - 0923 representing .963 acres.
7. Construction certification report dated 2 October 2002 for the operation of 5.80 acres of 17.80 acres, of Phase 1.

OPERATION:

8. Initial sampling report of monitoring system dated 18 October 2002.
9. Recorded permit to construct dated 13 August 2002 in Book: 9539 and Pages: 00315 to 00335.